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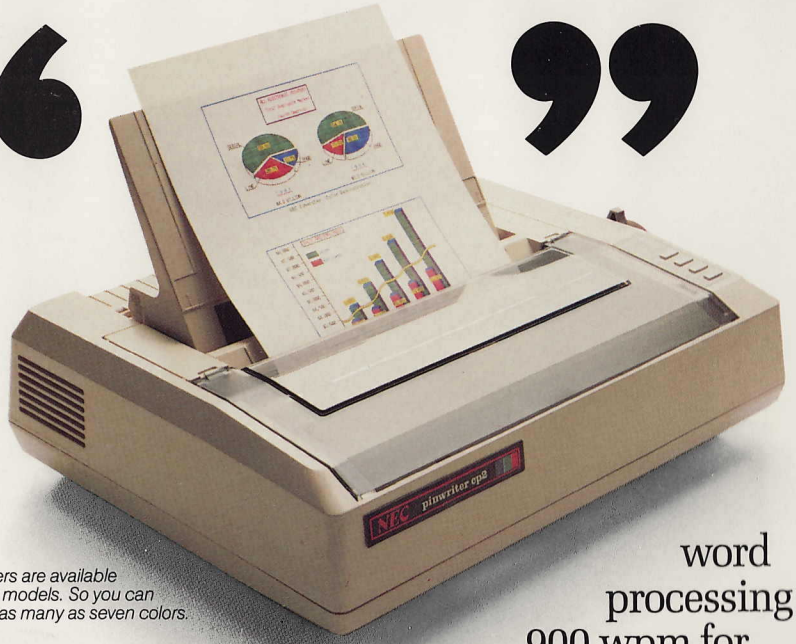

Pinwriters are available in color models. So you can print in as many as seven colors.

The reason most people buy a dot matrix printer is for versatility.

And that's exactly why you should buy an NEC Pinwriter™ printer. Because a Pinwriter lets you do more than any other dot matrix printer.

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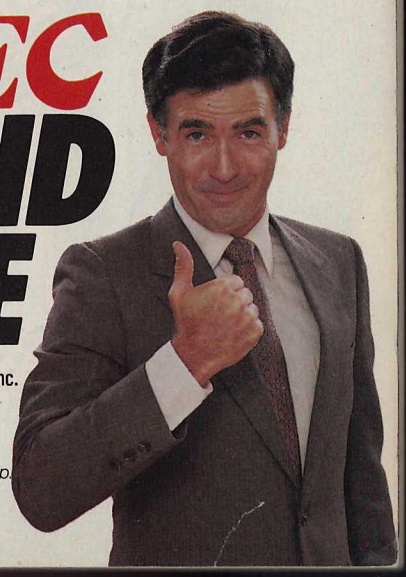

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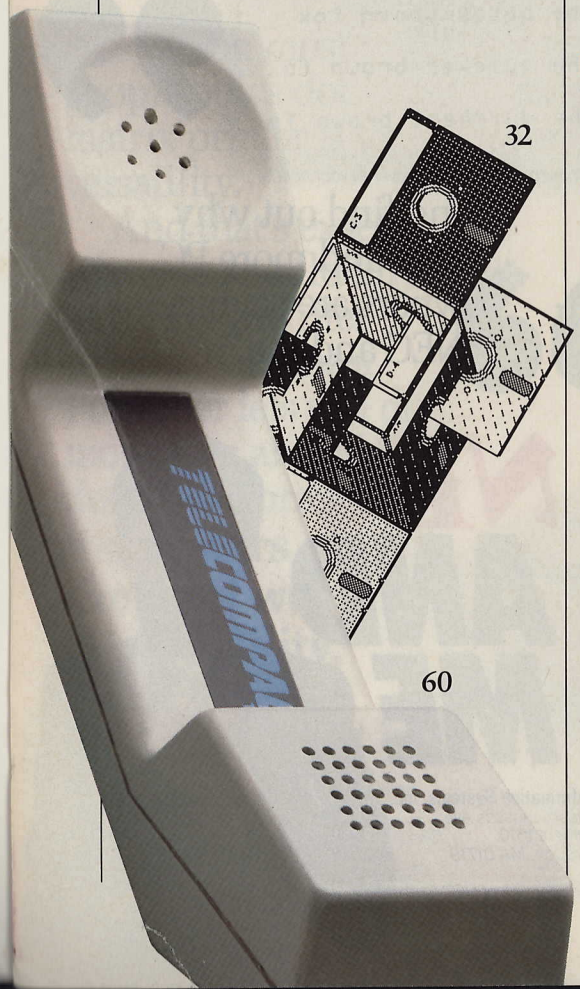

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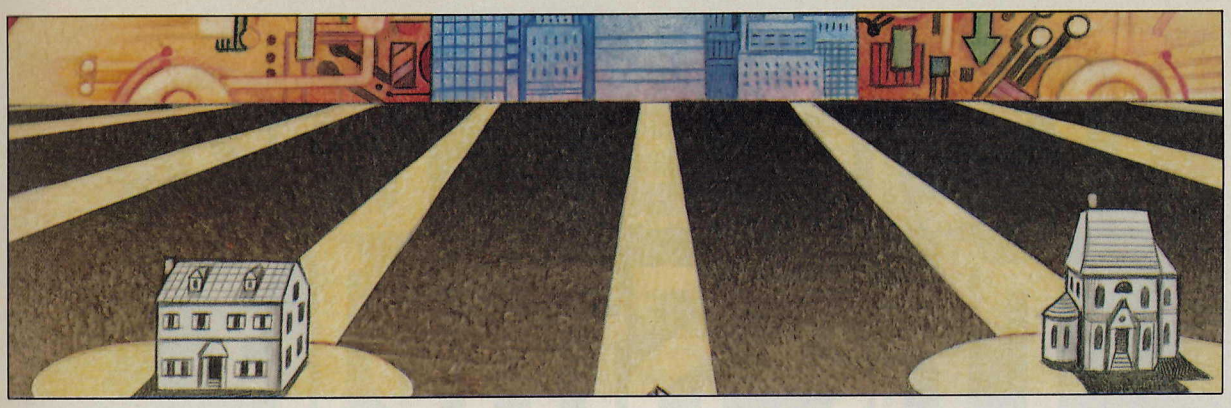

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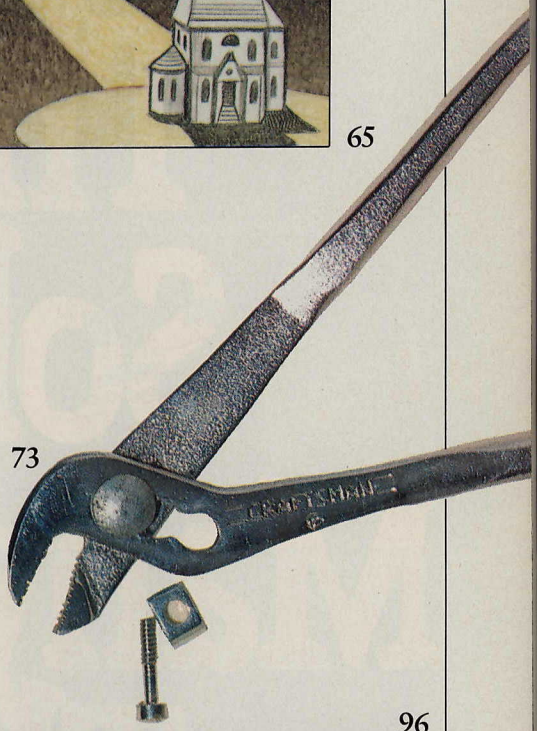

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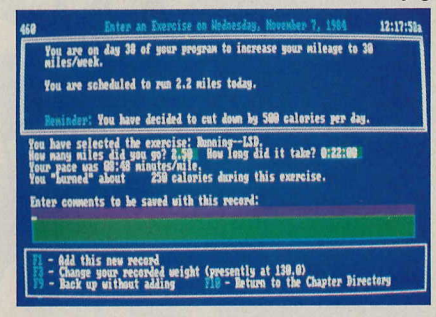
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Enter an Exercise on Wednesday, November 7, 1984 12:17:51a
You are on day 38 of your program to increase your mileage to 30 miles/week.
You are scheduled to run 2.2 miles today.
Reminder: You have decided to cut down by 500 calories per day.
You have selected the exercise: Running--LSD.
How many miles did you go? 2.50 How long did it take? 0:22:00
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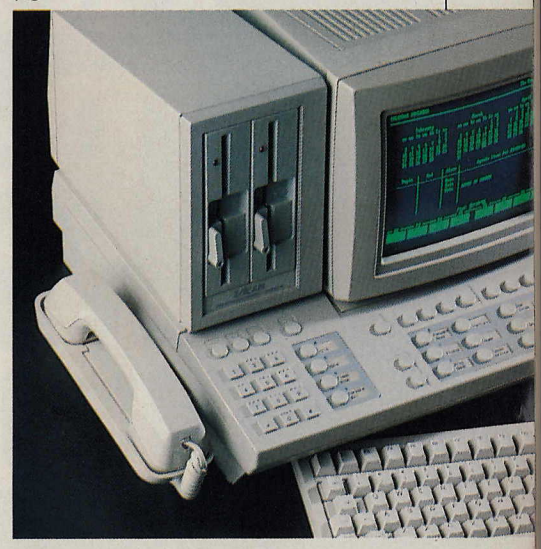

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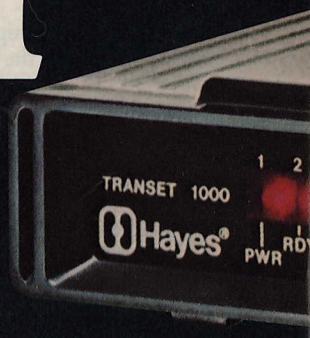
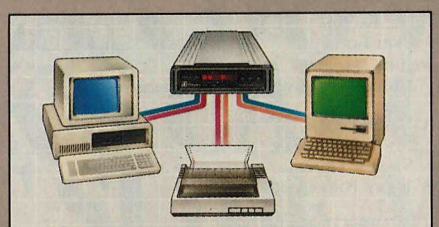


Transet 1000™ The print buffer, communications buffer, port expander, printer sharer and I/O switcher. All in one.

Anyone with a personal computer and one or more peripherals has faced the all-too-familiar dilemma. You need your computer to do an important job. But you're forced to wait for the system to finish one job (printing, communicating, whatever) before you can go on to the next one. Or you need to stop what you're doing to switch cables when you want to use another peripheral.

Wait no more. Now Hayes introduces an innovative new device that lets you perform many jobs—at the same time—independent of your computer. Transet 1000. It works with a wide range of systems and configurations. And it allows you to continually expand your system as your needs grow.

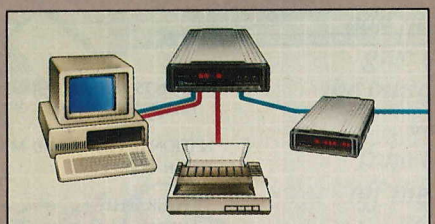
Transet 1000 frees your computer from waiting on your printer or modem—so you and your computer can go on to another task. It even lets you print out documents in pre-set formats without having to go back into your computer. At the same time, Transet 1000 can operate unattended mailbox communications—24 hours a day—even if your computer is turned off.



Two computers can share one printer with Transet 1000. Or, you can use Transet 1000 to let two computers communicate with each other.

In addition, Transet 1000 is a port expander and software-controlled I/O switcher. Now files can be easily directed and redirected to different peripherals, without physically changing cable connections.

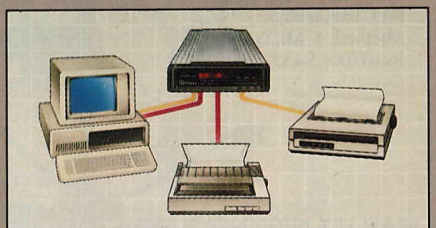
Transet 1000 contains a stand-alone microprocessor, and comes with 128K of memory. It operates with any RS-232 interface computer, and has optional accessory kits available for the IBM® PC and PC XT, Macintosh™ and Apple® IIc. Kits contain the necessary host cable, a user guide and menu-driven software that lets you graphically set up or customize port parameters and printing formats. Cables available for IBM PC AT, other computers and peripherals.



Even while printing, Transet 1000 acts as a communications buffer and 24-hour mailbox. And I/O switching lets you route information among peripherals, without switching cables.

Like all Hayes products, Transet 1000 combines sophisticated capabilities with easy operation. Just as Hayes set the standard in personal computer communications, now Hayes is taking the lead in computer task management.

Contact your authorized Hayes dealer to see how Transet 1000 can help you get a lot more productivity out of your computer system—without tying up your computer or you.



Transet 1000 allows printing on both a dot matrix printer and letter quality printer, while freeing your computer for other tasks.

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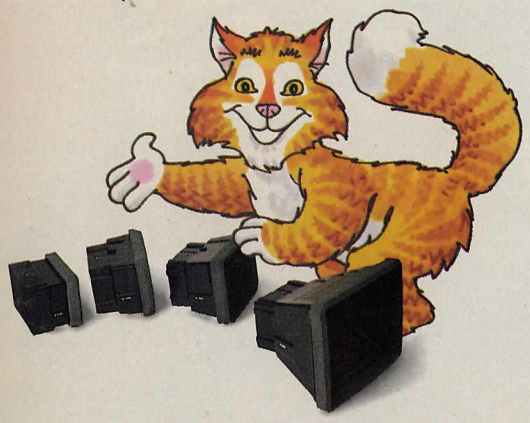

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Speaker to monitor call progress	Yes	Yes
Attractive, compact aluminum case	Yes	Yes
Two built-in phone connectors	Yes	**No**
Compatible with The Source and Dow Jones News Retrieval	Yes	Yes
Unattended remote test capability	Yes	**No**
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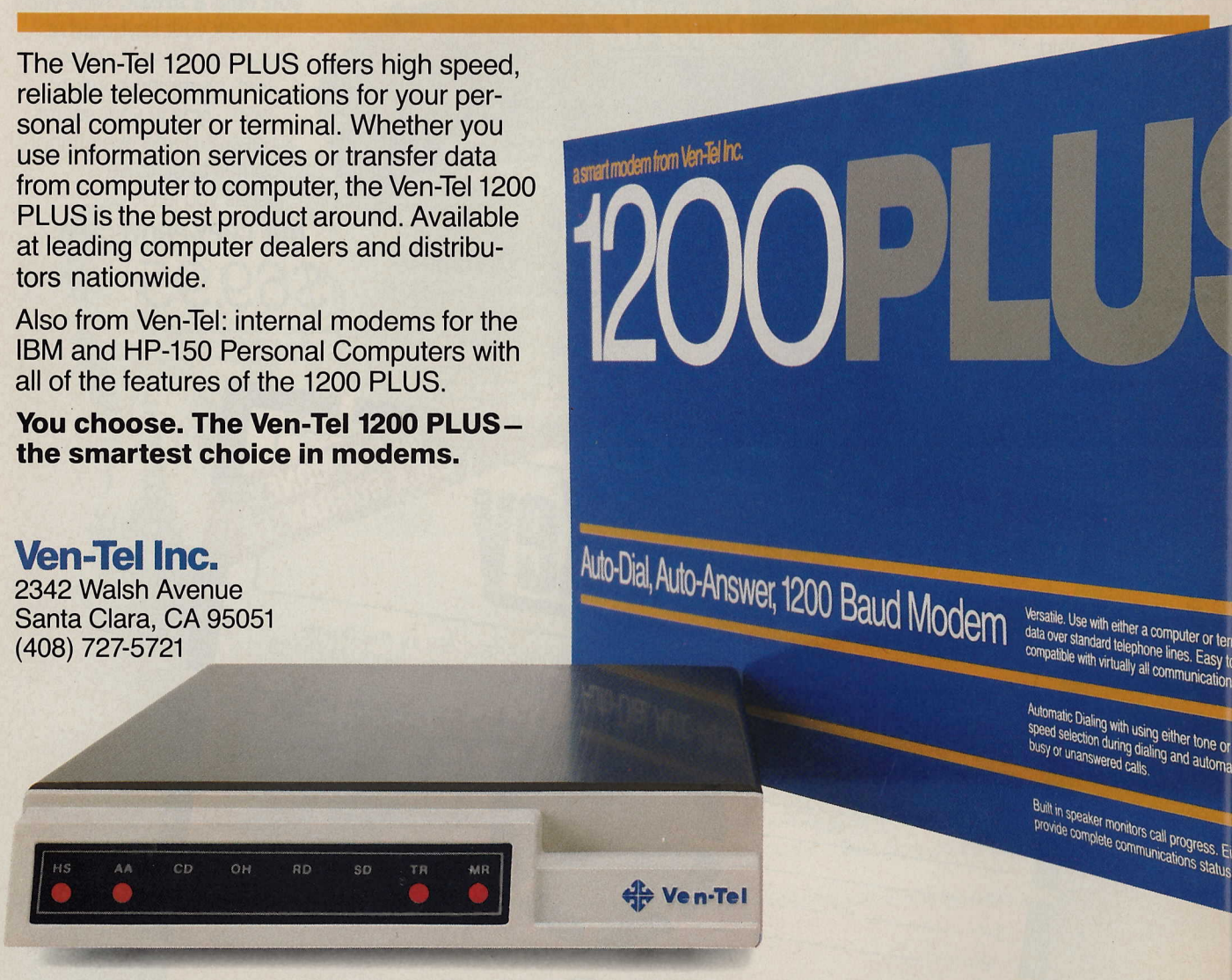
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1200PLUS
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MARKETPLACE, TECHNOLOGY, AT LARGE, PROFILES

NEWS

TI Broadens Business Computing Horizons

Taking a page out of Mark Twain's book, Texas Instruments has introduced a series of new products proving that reports of the firm's death in the personal computer market were greatly exaggerated.

At the top of the list is the Business Pro, a new personal computer that can run programs designed for the TI Professional series as well as those written for the IBM PC AT. Also, TI has announced a number of software and hardware options based on the firm's artificial intelligence research.

THE VERSATILE BUSINESS PRO

Built around the Intel 80286 central processor, the Business Pro can handle either TI or PC AT software, depending on which optional video controller you use. You can even install both controllers and the machine will automatically choose the one that fits the software. Thanks to its faster processor and RAM chips, the new machine is much speedier than the lower-priced, single-user TI Professional, which the firm will continue to offer. But the Business Pro's ability to run AT software is only part of its attraction, and TI is not promoting the machine as an AT clone.

The Business Pro's novel design has it configured as a tower that sits under or adjacent to a desk—the keyboard and an optional mouse plug into a tilt-and-swivel desktop monitor. This design complements the fact that the machine is one of the most expandable personal computers available. It can address as much as 3.5 megabytes of RAM on the main circuit board and up to a total of *15 megabytes* on expansion boards. Eight option slots accept full- and half-size expansion boards designed for the AT, and the Business Pro will also accommodate Intel's 80287 numeric coprocessor. TI will offer a variety of mass-storage devices, ranging from standard 1.2-megabyte floppy-disk drives to a pair of 72-megabyte hard disks with tape backup.

If all this sounds like overkill for a personal computer, it's because the Business Pro is also designed to be the hub of a local network when equipped with Novell's Netware software and 3 Com's Etherlink hardware. Moreover, with a Xenix operating system to be released this fall, the machine will function as a multitasking system supporting up to eight terminals.

The base machine with 512K bytes of RAM and a single 1.2-megabyte floppy-disk drive lists for $3995; an optional 21-megabyte hard disk ups the price to $5795. With either a TI or IBM video controller, the floppy-based system sells for $4440. At $13,700, the top-of-the-

line preconfigured system includes both video controllers, 72 megabytes of hard-disk storage, 60 megabytes of tape backup, a color monitor, 640K bytes of RAM, Etherlink networking hardware, and Netware software.

Though the TI Professional has been sold in a variety of retail outlets, the firm will now concentrate on direct sales, "value-added" resellers who typically put together a complete system with custom software, and dealers who combine hardware sales with additional software, support, and training. The company has successfully used the first two of these channels to sell its minicomputers. "We haven't in recent times focused on retail sales," says Wally Rhines, the new president of TI's Data Systems Group. "Instead, we're focusing on dealers who add value."

TI has also introduced noteworthy hardware and software options that complement the Business Pro. Many of these products—such as decision-support software, natural language interfaces, and speech recognition and synthesis systems—are based on the firm's work in artificial intelligence.

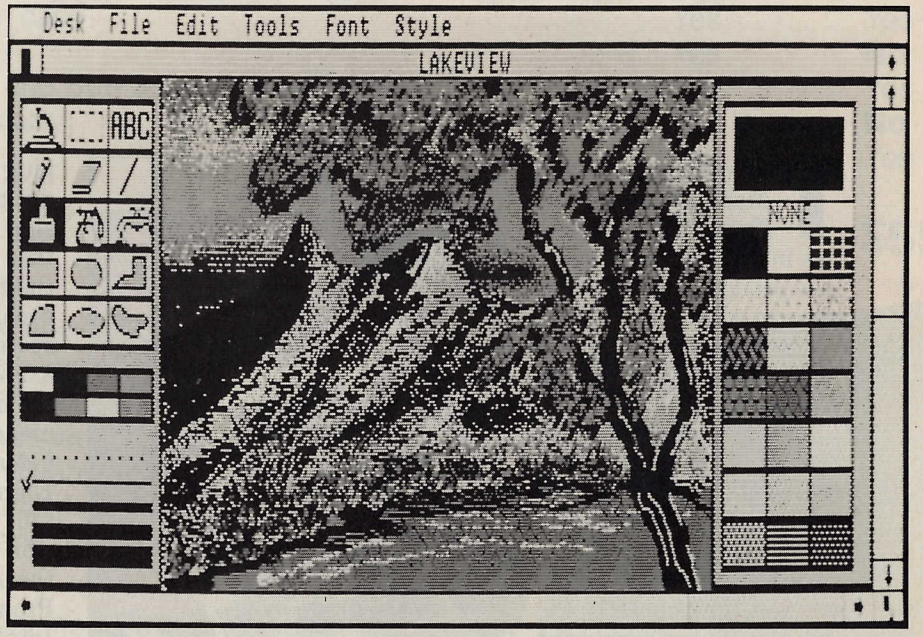
TI-Speech, for instance, is an expanded version of the original Speech Command System that now offers both enhanced voice recognition and text-to-speech conversion at 2400, 9600, or 32,000 bits per second. With the speech board you can train the system to recognize your spoken commands, while TI-Speech's text-to-speech converter (licensed from Speech Plus) articulates the words that appear on the monitor. The hardware alone sells for $995; the voice recognition vocabulary manager adds another $155.

New AI-based software includes Arborist, a sophisticated decision-analysis program that lets a manager make choices based on a decision tree model; Professional Consultant, a system designed to help programmers create expert systems; and a Natural Language tool kit for developers working on new applications for the TI Professional or the IBM PC family.

There are also several new Natural Link programs that make many popular applications (such as Lotus's 1-2-3) easier to use by giving them English-like commands. The tool kits, speech board, and Arborist will be available for both TI and IBM personal computers, while the individual Natural Link programs will work only on TI machines.

Tom Ellis, TI's vice president for marketing, said the firm does not currently plan to be a major IBM software developer. But he said Texas Instruments is offering the AI programs for IBM PCs in hopes of accelerating the demand for AI-based applications.

—MICHAEL J. MILLER



GEM DRAW FROM DIGITAL RESEARCH BRINGS MAC-LIKE ICONS TO IBM PCs.

Microsoft, DRI Court Vendors

The "windowing wars" are heating up. Both Microsoft and Digital Research are rounding up hardware manufacturers and software developers willing to pledge support for their new graphics-based operating environments.

Digital Research (DRI) has a slight edge—at least its Graphics Environment Manager (GEM) is out the door. A retail version of the GEM desktop—which looks remarkably similar to Apple's Macintosh display and functions in much the same way—and GEM Draw, an object-oriented drawing program, are already in retail outlets and available via mail order. The desktop costs $50, and GEM Draw is on sale for $149 until the end of August, when it's scheduled to go to $249. By early July, DRI plans to introduce The Collection, a $199 package containing a drawing program and a word processor (based on Lifetree Software's Volkswriter) that will be on special for GEM desktop owners at $99 through August.

According to DRI's William Riggs, these promotional efforts and low prices are intended to convince users to try GEM. These initial products, designed for the IBM PC family and compatible computers, support IBM's Extended Graphics Adapter, which offers a resolution of 640 by

When all else fails.

Most diskettes are pretty good.

And some of the time that's good enough.

But next time you throw away one that won't format or you lose the cash flow analysis you've been working on for weeks, make a mental note to try a box of Dysan diskettes.

They're better.

So much better, in fact, that major computer manufacturers put their names on our diskettes and sell them as their own.

Without fear of failure.

You see, we make our diskettes better with advanced manufacturing processes that our competitors have yet to figure out.

And we test them.

Almost to the point of absurdity.

Dysan diskettes are inspected almost a hundred times as they come down the line. They're tested to performance levels way beyond industry standards. And each one is certified to be 100 percent error free.

Then our corporate quality assurance fanatics come along and check them all over again. For all the same things. Plus some things only they understand.

When we're done, you get exactly what you wanted in the first place. Diskettes that will record and retain all your data all the time.

We don't expect you to keep all that in your mental note, but we would like you to remember your last diskette failure.

And when your computer products dealer offers you another box of pretty good diskettes, tell him you're ready for something better.

Dysan.

Call toll free for the name of the Dysan dealer nearest you. (800) 551-9000.

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Somebody has to be better than everybody else.

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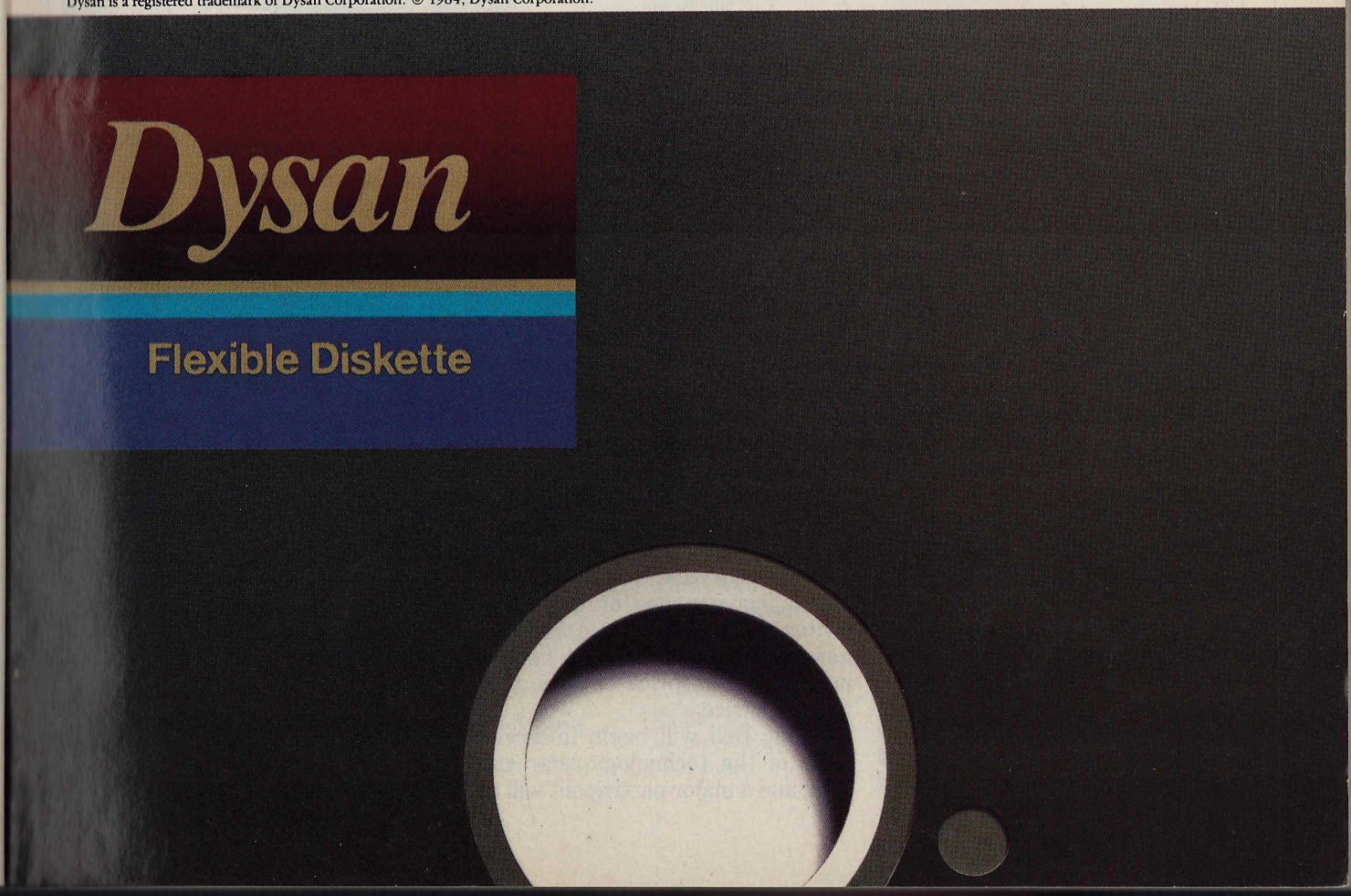

350 pixels with 16 colors. GEM appears in a single color when run under the more standard color/graphics adapter.

Among the hardware vendors who have said they will support GEM are Apricot, Atari (with its ST series), Commodore (with its as yet unnamed PC compatible), Contel/Cado, Epson America, Northern Telecom, and Texas Instruments. On machines like Atari's STs, GEM will be an integral part of the system, while Texas Instruments and others will offer GEM as an option.

At press time, DRI had also lined up support from 17 software vendors, many of whom produce Macintosh software. Well-known developers who say they will produce software designed to run under GEM include Chang Laboratories, Hayden, Infocom, Lifetree, Sierra On-Line, Software Products International, Spinnaker, and Thorn EMI.

Meanwhile, Microsoft has been drumming up support for its Windows environment for MS-DOS computers. The list of hardware manufacturers pledging support for the product includes nearly all the vendors of MS-DOS computers (with the notable exception of IBM). However, most of these agreed to support the standard back in the fall of 1983, and now the product is not scheduled to be available until this June. At press time the company could list only a handful of lesser-known firms that were committed to writing Windows programs, including Arity (a Lotus spinoff), Index Technology, Micrographics, and Softbridge Microsystems. Microsoft itself is planning to offer a retail version of the Windows desktop, along with several desk accessories and a simple word-processing program for under $100.

Windows differs from GEM in its use of "tiling" (windows that, instead of overlapping, adjust their size to fill available screen space); it also allows users to run several applications simultaneously. Both environments will compete with IBM's Topview, which also offers windowing but does not use graphics. Although few firms have said they will write applications that require Topview, many software vendors will make their programs work under it.

—MICHAEL J. MILLER

Multichannel Phone Lines in the Works

Pacific Bell, California's major telephone company, announced this spring that it has applied for a patent on technology that converts a single phone line into two voice and five data channels. If the project, code-named Victoria, becomes a commercial product, most California homes and offices near urban centers could be equipped with a line that would allow the family or business to engage in two separate voice conversations while digitally sending one 9600-baud and four 1200-baud data transmissions at the same time.

Potential applications of the technology include computer communications, emergency alarm services, remote meter reading, electronic banking, and videotex. Utilities and other firms would offer such services, and consumers could decide how they would like to use the available channels. "The main draw will be high-speed data transfer," says Pacific Bell spokesperson Jill Lander. "This brings the advantages of a dedicated data line to small users at a low cost." The company also expects that such a service would increase use of the public switched network, thus creating new revenues that would help to hold down the price of basic telephone service.

Pacific Bell will begin in-service tests of the technology later this year, and a major participant will be Apple Computer Inc. Del Yocam, Apple's general manager for the Apple II division, is excited about the potential of Project Victoria. "This new technology will expand the capabilities of the telephone line, allowing us to naturally integrate telecommunications with personal computers in the home," he says.

Until recently, experts believed that multiple communication channels with high-speed data transfer would appear only when fiber-optic cables, which transmit digital information as pulses of light, replaced existing copper cables. But Pacific Bell says Victoria may overcome the assumed limitations of copper cables.

—PAUL FREIBERGER

HEWLETT-PACKARD'S TOUCHSCREEN II

HP Plays Matchmaker

In a series of recent announcements, Hewlett-Packard introduced upgrades for its Touchscreen Personal Computer (also known as the HP-150) as well as new hardware and software products that work with those from other vendors.

The Touchscreen, which had a 9-

WordPerfect 4.0. Our highest marks yet.

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A perfect report card. It wasn't necessarily our goal when we added the most recent enhancements to WordPerfect. We were more interested in responding to the suggestions of our users and dealers.

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new version lives up to its perfect billing.

InfoWorld

Better.

WordPerfect 4.0 includes several features not found on many word processors. Like a 100,000-word phonetic dictionary; multi-page footnoting capability; table of contents and index generation; automatic outlining and paragraph numbering; and a 4.0 network version.

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inch monochrome monitor, has been replaced by the Touchscreen II, which has a 12-inch monitor. The new version still has an Intel 8088 central processor, double-sided 3½-inch microfloppy-disk drives, and 256K bytes of RAM, expandable to 640K bytes. Two expansion slots have been added, for a total of four, and there is now support for an 8087 math coprocessor.

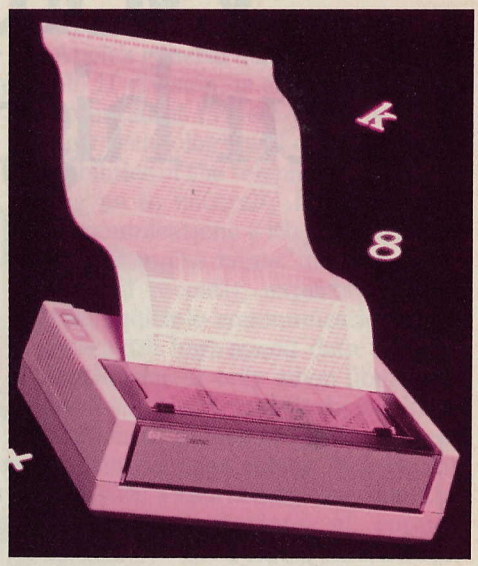
The touch-screen technology itself is now a $300 user-installable option rather than a standard feature; a color display is still not available. HP still sees the touch screen as an important part of the machine and expects most customers to purchase it. A dual floppy-disk Touchscreen II sells for $3545. Hard-disk versions are $4770 with a 10-megabyte disk and $5570 with a 20-megabyte disk.

Trying to provide total office automation by tying computers together, Hewlett-Packard has also introduced HP Access, a program that can transfer information from an Image database on an HP 3000 minicomputer to many standard MS-DOS databases, including dBASE II, Condor, and 1-2-3. Access will be available for HP and IBM personal computers. HP will also offer Print Central, a network program for the Touchscreen computers that lets several computers share the same printers.

HP has been quite successful with its $495 Thinkjet inkjet printer and its $3495 Laserjet laser printer, both of which can be used with machines from nearly all major computer manufacturers. The firm recently announced a version of the Thinkjet that uses a standard RS-232C interface, and together with new drivers offered by Softstyle, the RS-232C versions of either the Thinkjet or the Laserjet can now print Apple Macintosh graphics. Also, HP and Microsoft are jointly promoting the Laserjet for use with Microsoft Word on the IBM PC.

In addition, HP has introduced programs that let users connect the Touchscreen PC or an IBM PC to its HP-3000 line of minicomputers.

—MICHAEL J. MILLER



HP's RS-232C VERSION OF ITS THINKJET

News pages are compiled by West Coast editors Michael J. Miller, Paul Freiberger, and Jonathan Sacks.

OBSERVATIONS

PC Piggybacks on Mac

Bridging the gap between two seeming opposites, Dayna Communications of Salt Lake City has introduced MacCharlie, an IBM PC emulator for the Macintosh. The software/hardware product, which fits on the side of the Mac, is based on an 8088 processor and mimics the IBM PC's monochrome monitor adapter so you can display IBM software on the Mac's integral screen. MacCharlie's memory can serve as a print buffer while you're running Macintosh software. The product comes with 256K bytes of RAM and a single 5¼-inch disk drive for $1195 or with 640K bytes and dual disk drives for $1895. Despite the fact that Dayna did not have a working prototype as late as March, the firm promised May shipment.

Enhancing MS-DOS

Starbridge Technologies of Los Angeles recently announced Starbridge DOS, which gives you "plain English" commands in a menu instead of the typical DOS commands. The $49.95 package occupies 64K bytes of RAM and runs in conjunction with MS-DOS on the IBM PC family and compatible computers. Hammer & Associates (Larkspur, CA) has introduced E-Z-DOS-IT, a $200 concurrent-processing option that lets you run as many as eight MS-DOS programs at the same time. The program requires DOS 2.0 or higher and at least 256K bytes of RAM. It divides your computer's memory into several sections and lets you install an application in each.

One, Two, Three, More

Optionware Inc. (Bloomfield, CT) has brought out an array of new software products that run within Lotus's 1-2-3. Most interesting is Optionword Plus, a simple line-oriented word processor. In addition, the firm offers nearly sixty 1-2-3 models ($100 each) covering a variety of applications. For producing better 1-2-3 charts and graphs, LCS/Telegraphics (Cambridge, MA) presents Telepaint, a $149 package that delivers additional graphics-editing capabilities. All these products run on the IBM PC and compatibles.

Updates

Some changes to hardware and software we've previously reviewed:

☐ Living Videotext is now shipping a new version of its Think Tank outline processor for the IBM PC and compatible computers and the TI Professional. The upgrade adds color and much more sophisticated editing capabilities.

☐ Apricot Inc. has removed the applications software bundle from its Apricot Portable; the system still comes with activity software.

☐ AST Research will be bundling Borland International's Sidekick desk accessory program with AST's Six Pak Plus multifunction card.

☐ Apple is finally shipping the flat-panel display for the IIc. Unfortunately, it's not very readable.

COMPAQ doesn't make compromises. That's why we're still making history.

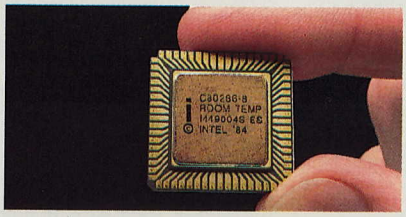
COMPAQ®

Presenting the most capable

No other computer company has ever grown as fast as COMPAQ, because no computer company makes computers as powerful, as complete and as useful as COMPAQ. That's why the original COMPAQ Portable, COMPAQ PLUS,™ and COMPAQ DESKPRO™ became worldwide best sellers overnight. Now COMPAQ is introducing two new computers that advance the state of the art even further. While the original COMPAQ products remain cost-efficient cornerstones of business and professional use, especially for first-time buyers, the new products represent the utmost in performance for second-time buyers, or anyone who needs exceptional power and speed.

Triumphs of advanced technology

The new COMPAQ PORTABLE 286™ and COMPAQ DESKPRO 286.™ Advanced technology puts them in a class all their own. With power, performance, speed, and expandability that exceed even the IBM® Personal Computer-AT.™ They represent a new standard that makes others look like what they are—the products of compromise. In fact, the new COMPAQ 286 Personal Computers can be considered the most useful in the world.



The new 80286 "chip" in COMPAQ 286 Computers processes data faster.

Power with a bonus—portability

The COMPAQ PORTABLE 286 redefines portable computers. We gave it power to match IBM's most powerful desktop computer, the IBM PC-AT. Then we designed it to run all the popular programs and hardware designed for the IBM PC-AT. But we didn't stop there. COMPAQ pushed the technology further.

The COMPAQ PORTABLE 286 runs 30% *faster*. It can give you up t 20 Megabytes of internal fixed disk drive storage. And can come with features to make it even more useful Like our *internal* fixed disk drive back-up system that protects 10 Megabytes of information on a single pocket-sized tape cartridge.

But the most amazing thing about the COMPAQ PORTABLE 286 is that all these features come attached to a handle.

Our most advanced desktop computer

Like the COMPAQ PORTABLE 286, the new COMPAQ DESKPRO 286 runs all the popular programs designed for the IBM PC-AT, 30% *faster*. And it can also come with our convenient *internal* fixed disk drive back-up system for added data protection.

But we didn't stop there. We weren't content to compromise. We wanted to make the new COMPAQ DESKPRO 286 a more powerful, more efficient stand-alone personal

personal computers in the world.

computer, as well as a faster, more powerful, more useful file server. So we gave the COMPAQ DESKPRO 286 far more memory and storage capacity—over 8 Megabytes of RAM and 70 Megabytes of high-performance fixed disk storage.

The legends continue

Not everyone will need the extra performance of the newest COMPAQ Computers. That's why we built our original line to last a long time.

These workhorses—the COMPAQ Portable, COMPAQ PLUS and COMPAQ DESKPRO Computers—are essential to many professional and business users. They run thousands of industry-standard programs developed for the IBM PC and PC/*XT*.™ They're indispensable tools in use on all seven continents (yes, even the South Pole!).

Above all, no compromises

The unprecedented success of COMPAQ came as no accident. While others built limited computers, COMPAQ built expandable computers.

While others took two screens to display high-resolution text and graphics, COMPAQ was the first to do it on one.

While others were looking for ways to cut corners, COMPAQ looked for ways to eliminate downtime by building the most rugged, reliable computers in the world.

The COMPAQ commitment to a philosophy of "no compromise" made the COMPAQ Portable and COMPAQ PLUS the world's best-selling 16-bit portable personal computers. In 1983 COMPAQ sold $111 million worth of computers to achieve the most successful first-year sales of *any* company in American business history.

In 1984, we introduced the COMPAQ DESKPRO. In only four months, it became the second-best-selling 16-bit desktop business system in U.S. retail computer stores. And as a result, we've concluded the most successful second year of any computer company, with sales of $329 million.

The reason for this success is simple.

COMPAQ computers have been recognized worldwide. Awards include:

- *COMPAQ PLUS selected and voted Europe's 1984 Computer of the Year in the portable category.*
- *COMPAQ PLUS voted by readers of PC WORLD as their favorite product in its category in the "1984 World Class PC Contest."*
- *COMPAQ PLUS selected as the first-place winner in its category in the Creative Computing Top 12 Computers of 1984 Awards.*
- *COMPAQ Portable rated best personal business computer in overall user satisfaction by the Yankee Group market research firm opinion poll.*
- *COMPAQ DESKPRO named by PC Week magazine as one of the top ten products of 1984.*

We offer people personal computers that simply work better. And make no compromises doing so.

Introducing the new COMPAQ PORTAB
computer helps y

Anyone can make a portable computer. But to make one that runs all the popular programs designed for the IBM PC-AT, 30% faster—in a package almost half the size—was no small challenge. But one COMPAQ welcomed.

Go faster, go further

The COMPAQ PORTABLE 286 is paced by the advanced technology of the 8-MHz, Intel 80286 microprocessor. This advanced technology has numerous advantages. One advantage is the flexibility to work with several different operating systems so you're not forced to choose a personal computer solely on that basis.

The advanced capabilities of this microprocessor become even more apparent when you run complex programs. You can operate as part of a network. Or you can operate more than one program at the same time using multi-tasking software like IBM TopView.™ And you can handle the most difficult problems with breath-taking speed.

For many scientific and engineering programs you have the ability to add an 80287 coprocessor, which offers even more speed.

Both offer dramatic speed increases over earlier microprocessors. The faster response time means less waiting, and more productivity.

Power in a package

The COMPAQ PORTABLE 286 has the power of the IBM PC-AT. But the IBM PC-AT doesn't have a handle. Ours does. So it goes where you go. Works where you work. Whenever and wherever necessary. And it's easy to share with co-workers.

That's full-function portability, pure and simple.

A COMPAQ PORTABLE 286 can le office when you do. Take your work wher

Expandability without getting

All the devices that increase the bilities of the COMPAQ PORT 286 go on the inside—not the o —of the computer.

You can get it with one or tw

286. Our fastest, most powerful portable do more – anywhere.

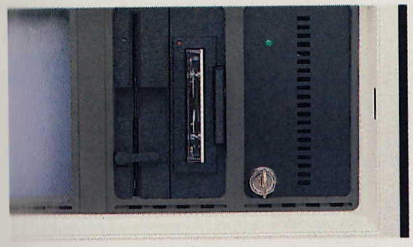
height 1.2-Megabyte diskette drives. Although they can "read" diskettes formatted for 360-K byte diskette drives, they cannot "write" to them. Therefore, as an option, COMPAQ offers a 360-K byte diskette drive to let you exchange data with other industry-standard personal computers.

There's an additional slot for a 20-Megabyte fixed disk drive. All COMPAQ Portable Computers offer fixed disk drive systems that fit *inside* the computer.

Another of our options: An *internal* fixed disk drive back-up system keeps a safety copy of your work, reducing the chance of losing your data. COMPAQ pioneered the system first in desktop computers, and now in portables.

The COMPAQ PORTABLE 286 even comes with a security lock feature that locks "on" to prevent interruption of a file transfer, or "off" to deny access to confidential information.

Because it's a portable, self-contained unit, the computer can be easily stored away after use.



Two data protection features from COMPAQ: an internal fixed disk back-up system that stores data on tape cartridges, and a security lock for locking keyboard access to your system on or off.

Who can use it?

If you're an experienced user, you may be ready to upgrade your current equipment. The COMPAQ PORTABLE 286 gives you the latest technology.

For some, power is all-important: Speed, performance, and the ability to handle the most powerful software. All are leading qualities of the COMPAQ PORTABLE 286.

Starting a business? The COMPAQ PORTABLE 286 has tremendous data base capabilities to help you keep track of your inventory, your customers, your employees, your finances. Its exceptional storage capabilities make it ideal for the complexities of accounting. Its exceptional speed means greater networking ability. Its tremendous power enables you to get the edge on the competition.

In addition, large corporations can place several of these computers with field representatives to provide clients immediate information on current prices, product availability, even shipping dates and routing. So delivery shortages can be anticipated and avoided.

The COMPAQ PORTABLE 286 can also travel within the company. From office to office. Desk to desk. From accounting, to marketing, to research.

It's powerful and versatile enough to do almost any job. Light enough to carry. And tough enough to survive lots of users.

Established reliability

Despite its newness, the COMPAQ PORTABLE 286 is in many respects a proven product. It's based on the rugged, reliable design of the original COMPAQ Portable and COMPAQ PLUS. Many of the construction techniques like cross-bracing components and shock-mounting disk drives are identical. All of which goes to prove our point: No other portable computer can measure up to the advanced power and potential of the uncompromising COMPAQ PORTABLE 286.

The COMPAQ PORTABLE 286 Specifications

Processor: 16-bit 80286; 6 or 8 MHz clock speed. **Software:** Fully compatible with all major software applications written for the IBM PC-AT. **Expansion Slots:** 3 available slots in base configuration. **Memory:** 256-K bytes RAM, expandable to 2.6 Megabytes. **Storage Devices:** 360-K byte or 1.2-Megabyte diskette drives, 20-Megabyte fixed disk drive, fixed disk drive back-up (10 Megabytes per tape). **Interfaces:** RGB color monitor, RF modulator, composite video, parallel printer, and asynchronous communications interfaces. **Keyboard:** Standard IBM PC-AT layout (84-key). **Display:** 9-inch diagonal green monochrome dual-mode monitor, high-resolution text characters, high-resolution graphics. **Security:** Locks in operating and non-operating mode to prevent unauthorized keyboard access. **Physical Specifications:** 20″W x 8½″H x 16″D. **Options:** Technical reference guide, MS-DOS™/BASIC Version 3, 512/2048-K byte memory board.

Introducing the new COMPAQ DESKPRO 28
offers more expansio

The capabilities of the new COMPAQ DESKPRO 286 represent a personal desktop computer as practical as it is technically advanced. Plus, it maintains compatibility with the IBM PC-AT.

Utmost expandability

That's no exaggeration. The COMPAQ DESKPRO 286 can expand to give you massive storage and memory.

Without clutter. Expansion is *internal*.

It comes with a single, half-height, 1.2-Megabyte diskette drive. You can add a second drive of the same capacity, or a 360-K byte diskette drive so you can exchange information with other personal computers.

For fixed disk storage, an internal 20-Megabyte system is available. You can also choose a 30- or 70-Megabyte high-performance internal fixed disk drive sytem. The storage capacity of each is equivalent to 10,240, 15,360, or 35,840 pages of double-spaced data.

One expansion board works with all the fixed disk drives. When you upgrade to a larger fixed disk storage system, a new board is not required.

To back up data, use the COM
internal fixed disk drive back-up s
It's also a safe and convenient wa
store information for record keep

Hardworking, networking

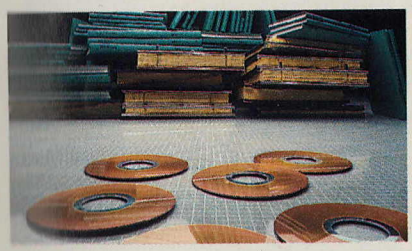
Alone, the COMPAQ DESKPR
286 is a tremendously useful comp
It doesn't limit you to using softw
under any one operating system.
runs all the popular programs des
for the IBM PC-AT. It can be con
figured for advanced color graphi
display using a color monitor and
IBM Enhanced Graphics Adapte

Our most powerful desktop personal computer more speed and more flexibility.

An enhanced keyboard layout, with shift keys in easy reach for touch typists, is standard on the COMPAQ PORTABLE 286 and COMPAQ DESKPRO 286.

The modular design of the computer also lets you configure RAM and storage to the exact needs of any individual. So you never have to buy more computer than you need. Or worry about obsoleting your investment because you bought less computer than you need.

The COMPAQ DESKPRO 286 also makes the ideal hub of a local area network. Using networking packages, your computers (and your people) can share information and software, and can communicate with one another. With 70 Megabytes, the COMPAQ DESKPRO 286 becomes a powerful, high-performance file server. You can store lots of data, as well as store several programs you can run simultaneously when using software programs like IBM TopView. Your computer will perform at lightning speeds. And other configurations can make economical "nodes" of the network.



A fixed disk can store enough programs and data to handle all the accounting for most businesses.

Where to start

The flexibility of the COMPAQ DESKPRO 286 allows you to begin at any level of computing power and reach beyond the IBM PC-AT.

You can use your computer for writing extensive documents, preparing professional graphics for presentations, and for doing complicated financial studies. Chances are, however, you'll not want to stop there. You'll discover new ways for streamlining your work. You'll want to do customer lists, accounting tasks and business taxes, product inventory, annual sales projections on spreadsheets. You have the option of adding a second diskette drive, a fixed disk drive, more memory, even a fixed disk drive back-up system. All are available and can be added to the inside of your COMPAQ DESKPRO 286—easily, affordably, without losing your initial investment in hardware, software, or training.

A proven heritage

The COMPAQ DESKPRO 286 is of tested lineage. It has many of the reliable construction and design qualities of the COMPAQ DESKPRO. It has further conveniences like a dual-function security lock to prevent unauthorized access. As well as greater performance, power, and speed. The COMPAQ DESKPRO 286 stretches the limits of personal computing—with no compromises.

The COMPAQ DESKPRO 286 Specifications

Processor: 16-bit 80286; 6 or 8 MHz clock speed. **Software:** Fully compatible with all major software applications written for the IBM PC-AT. **Expansion Slots:** 5 slots available in base configuration. **Memory:** 256-K bytes RAM, expandable to 8.2 Megabytes. **Storage Devices:** 360-K byte or 1.2-Megabyte diskette drives; 20-(half-height), 30-, or 70-Megabyte fixed disk drives; fixed disk drive back-up (10 Megabytes per tape). **Interfaces:** RGB color monitor, RF modulator, composite video, parallel printer, and asynchronous communications interfaces. **Keyboard:** Standard IBM PC-AT layout (84-key). **Display:** 12-inch diagonal green or amber dual-mode monitor, high-resolution text characters, high-resolution graphics. **Security:** Locks in operating and non-operating mode to prevent unauthorized access; cover lock to protect internal components. **Physical Specifications:** System unit—19.8″W x 6.4″H x 16.5″D, Keyboard unit—18.0″W x 1.5″H x 7.0″D, Display unit—14.75″W x 10.25″H x 13.75″D, Weight—57–64 lbs., depending on configuration. **Options:** MS-DOS/BASIC Version 3, Tilt & Swivel Monitor Stand, Desk-Saver, Technical Reference Guide, 512/2048-K byte memory board.

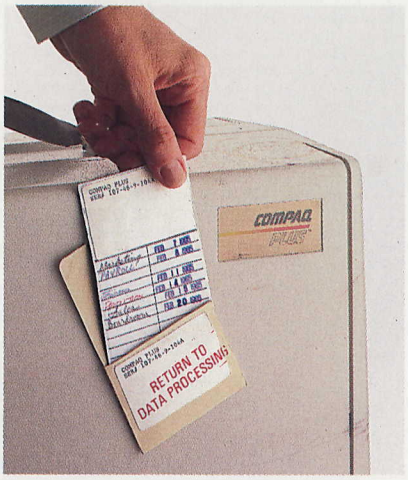
COMPAQ makes full-function portability a full-fledged reality.

If you're anxious to put a computer to work for you, but don't need the extra power and added performance of our most advanced portable computer, we have the answer.

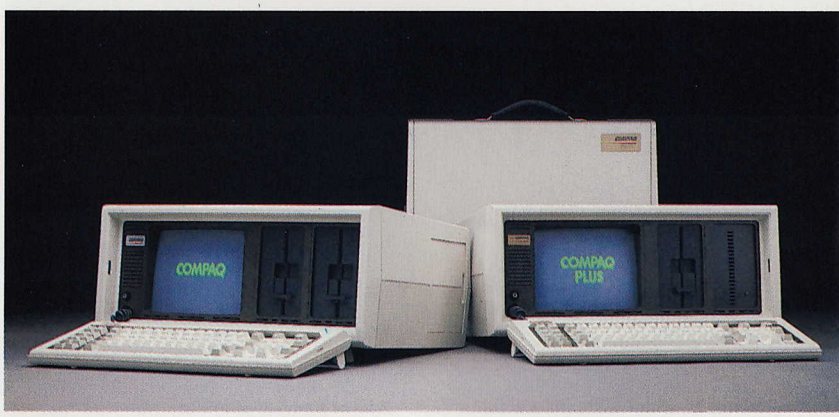
Lots of software, lots of uses

The COMPAQ Portable and COMPAQ PLUS are based on the 8088 microprocessor, one of the most popular computer technologies, so software is abundant. Integrated business programs, personal productivity, learning tools, even educational thoughtware to sharpen your business skills. Literally thousands of programs, compatible with the IBM PC and IBM PC/*XT*, will run on the COMPAQ Portable and COMPAQ PLUS.

Many businesses put the COMPAQ Portable or COMPAQ PLUS to work as a full-time computer for part-time users. Carry it from desk to desk. Office to office. Let several people use it for one or more hours a day. Or one person use it a few days a week.



Many companies use a COMPAQ Portable as a full-time computer for part-time users.



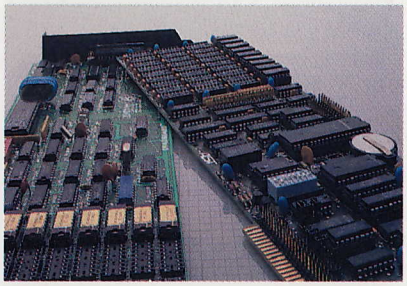
For heavy users, a COMPAQ Portable or COMPAQ PLUS can become a "second computer" for computing power away from the office.

With their rugged, uncompromising construction, they're built tough enough to pass around—something that's impractical to do with desktop computers. And because you stretch its use, you stretch your budget as well.

If you need more, it does more

How can one computer be so versatile?

One reason is the ability of the COMPAQ Portable to become a COMPAQ PLUS with the addition of a 10-Megabyte fixed disk drive. This expands storage capacity to the equivalent of 5,120 double-spaced pages of information.



Expansion boards let you add memory and extra functions inside, not out.

There are other ways to improve on your COMPAQ. Hundreds of industry-standard expansion boards are available. They fit neatly inside your COMPAQ. So you can run more advanced programs. Communicate over telephone lines. Network with other computers.

It's this kind of versatility and ease of use that makes COMPAQ Personal Computers second to none.

SPECIFICATIONS

The COMPAQ Portable

Processor: 16-bit 8088, 4.77 MHz clock speed. **Software:** Fully compatible with all major software applications written for the IBM PC/*XT*. **Storage Devices:** One or two 320-K byte diskette drives. **Expansion Slots:** 3 available slots. **Memory:** 128-K bytes RAM expandable to 640-K bytes. **Display:** 9-inch green diagonal monochrome dual-mode monitor, high-resolution text characters, high-resolution graphics. **Interfaces:** RGB color monitor, RF modulator, composite video, and parallel printer. **Keyboard:** Standard IBM PC layout (83-key). **Physical Specifications:** 20″W x 8½″H x 16″D.

The COMPAQ PLUS

Specifications the same with the exception of: One 360-K byte diskette drive, one 10-Megabyte fixed disk drive, 2 available expansion slots, and full compatibility with all major software applications written for the IBM PC and PC/*XT*.

Lasting value led to instant success for the COMPAQ DESKPRO.

If you don't need all the extra performance of the COMPAQ DESKPRO 286, you can buy the popularly priced COMPAQ DESKPRO and still get many advanced features.

A command performance at every level

The COMPAQ DESKPRO Series allows you to buy as *much* computer as you need—not *more* computer than you need.

It's a polished performer, from entry level to advanced computing, in one totally expandable unit. Its plug-in, modular design accepts up to four separate storage devices. You select almost any combination of diskette or fixed disk drives you desire. And there's the practical, internal fixed disk drive back-up system to protect and store your data. So as your needs grow, the DESKPRO grows.

In fact it will grow from an IBM PC to far beyond the IBM PC/*XT* level of functionality. The COMPAQ DESKPRO will run all the popular programs written for both the IBM PC and PC/*XT*, two to three times *faster*, without sacrificing compatibility.

Internal expandability saves desk space.

Power? It's got what it takes.

The COMPAQ DESKPRO can be easily configured for scientific, engineering, and advanced business applications.

A high-performance, 30-Megabyte fixed disk drive provides added storage capacity.

The ability to add a high-speed 8087-2 coprocessor lets you deal with complex scientific calculations and economic models.

SPECIFICATIONS

The COMPAQ DESKPRO

Processor: 16-bit 8086; 4.77 or 7.14 MHz clock speed. **Software:** Fully compatible with all major software applications written for the IBM PC and PC/*XT*. **Expansion Slots:** 6 slots available in base configuration. **Memory:** 128-K bytes RAM, expandable to 640-K bytes. **Storage Devices:** One or two 360-K byte diskette drives, 10-(half-height) or 30-Megabyte fixed disk drives, fixed disk drive back-up (10 Megabytes per tape). **Interfaces:** RGB color monitor, RF modulator, composite video, parallel printer, and asynchronous communications interfaces. **Keyboard:** Standard IBM PC layout (83-key). **Display:** 12-inch diagonal green or amber dual-mode monitor, high-resolution text characters, high-resolution graphics. **Physical Specifications:** System unit—19.8″W x 5.8″H x 16.5″D, Keyboard unit—18.0″W x 1.5″H x 7.0″D.

Features common to COMPAQ in most other

It's been easy for COMPAQ to recognize the compromises other personal computer makers have been making.

It's been just as easy to avoid them.

That's why performance, expandability, compatibility, durability, and versatility are features you'll find in the entire COMPAQ family of computers.

How advanced technology affects the choice you make

There's an ever-growing library of fast, powerful programs designed for the IBM PC-AT and compatible with the COMPAQ PORTABLE 286 and COMPAQ DESKPRO 286. These programs will utilize the full potential of the computer "nerve center"—the Intel 80286 microprocessor.

If you own a COMPAQ Portable, COMPAQ PLUS, or COMPAQ DESKPRO, you may discover that these newer programs are simply too big to run on your computer.

Therefore you have a choice: the extra power and speed of the 80286 or the popular COMPAQ Personal Computers that use the 8088 and 8086 microprocessors. Remember that the COMPAQ PORTABLE 286 and COMPAQ DESKPRO 286 offer more power, speed and performance than any other personal computer. If your needs don't require the advanced technology, or you need a second computer to complement the one you have now, consider the COMPAQ Portable, COMPAQ PLUS, or COMPAQ DESKPRO. All three are hardware and software compatible with the IBM PC and PC/*XT*. Our intention is to give you a choice without forcing you to invest in more, or less, computing power than you think you need.

Of course, COMPAQ Personal Computers maintain compatibility with the add-on devices and expansion boards available for industry-standard personal computers, without any alteration or modification.

Increased power without increased size

All COMPAQ Personal Computers can take on more memory and storage without taking up more space. The COMPAQ Portable becomes a

Internal add-on devices add greatly to the capabilities of a COMPAQ Computer.

COMPAQ PLUS when you add a 10-Megabyte fixed disk drive. The COMPAQ PORTABLE 286 can accept a 20-Megabyte fixed disk driv The fixed disk drive fits neatly beside the diskette drive inside the unit.

With the COMPAQ DESKPRO and COMPAQ DESKPRO 286, you can install almost any available combination of diskette or fixed disk drives you desire to achieve the level of performance you need. The COMPAQ DESKPRO and COMPAQ DESKPRO 286, along with the COMPAQ PORTABLE 286, can accept the fixed disk drive back-up system as one of the internal storage devices.

There are slots inside each COMPAQ Computer for optional expansion boards. These boards grea enhance the functionality and versati ity of your computer. Literally hundreds are available to plug right in. Each lets you do something different Like expanding the amount of memo in your computer. Or communicatin with other personal computers. Or

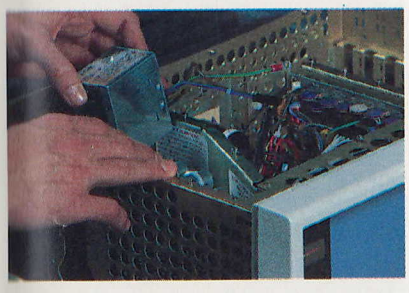
Computers are features uncommon personal computers.

even communicating with mainframe computers.

Built tough to take it

COMPAQ Portable Computers are expected to take some hard knocks. A specially designed shock isolation system protects the diskette drives from jolts and vibration.

Their inner components are surrounded by a cross-braced aluminum frame. Those equipped with fixed disk drives are protected by a triple shock mount system. Plus, the outer case is molded from high-impact plastic, the same kind used to make bulletproof windows and space helmet faceplates. COMPAQ Portable Computers are tough, protecting your data from every angle.

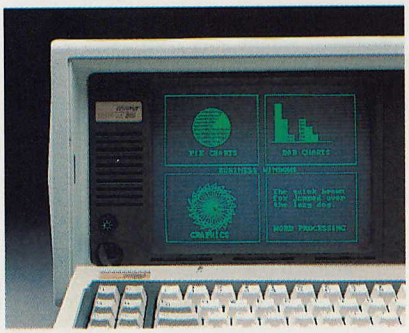


COMPAQ DESKPRO Computers are no pushovers, either. They're surrounded by a protective steel shell.

They're the only desktop computers made with protective shock mounts, isolating the disk drive compartments from those unexpected but inevitable bumps and knocks that can cause downtime.

Even our monitors do more

COMPAQ Computers display data on high-quality monitors. All models can display high-resolution text and graphics on the same screen. The dual-mode display saves you the cost and clutter of a second monitor. COMPAQ DESKPRO Computers give you a



High-resolution text and graphics on one screen eliminates the need for a second monitor.

choice of an amber or green display.

From pinstripe suits to flight jumpsuits

The structure and design of COMPAQ Computers best characterize their widespread usefulness and respected capabilities. COMPAQ attentiveness to construction details and concern for functionality under stressful conditions are why these computers have received worldwide acceptance.

That's why you'll find a COMPAQ Computer on the bench of a major league baseball team tracking player performance.

At the South Pole monitoring weather conditions for the research team of a major university.

On tour with famous rock stars to help plan concerts, keep up with the finances, and receive electronic mail.

On motion picture sound stages scheduling production and maintaining equipment inventory.

On military surveillance planes logging information five miles aboveground.

In the halls of the Supreme Court answering complex questions on environmental issues.

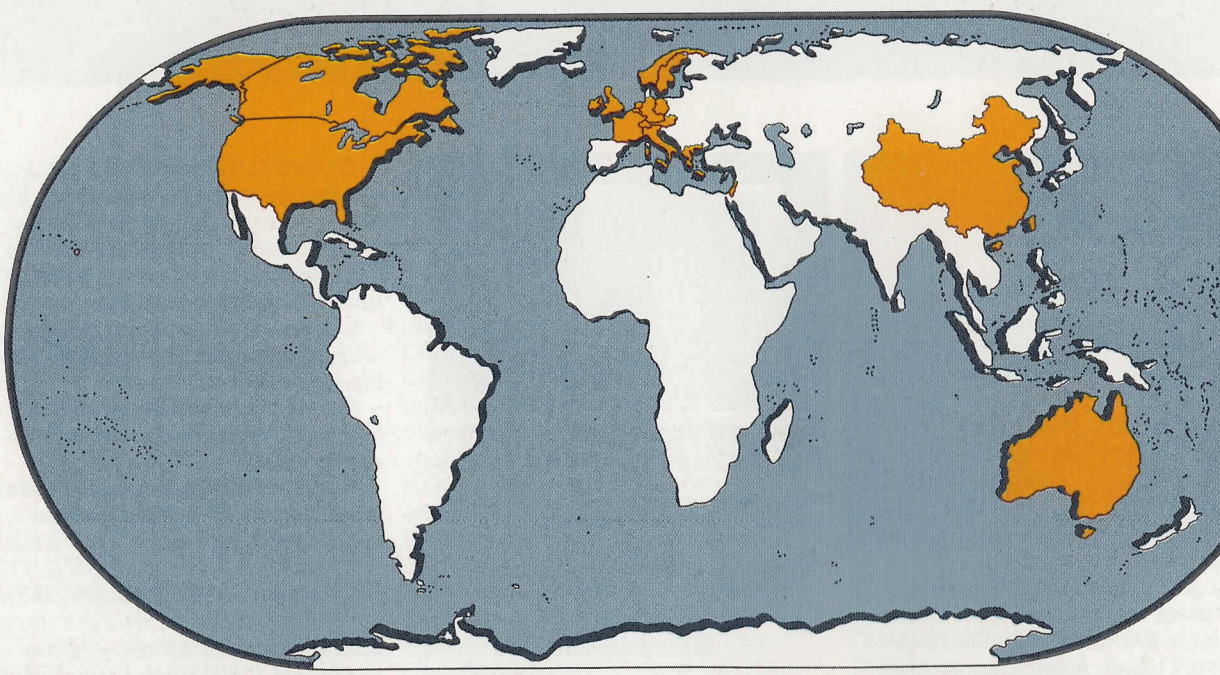
Computers people believe in

It didn't take long for the public to recognize COMPAQ Computer quality. No one builds them the way we do. Which is why no other computer company has grown the way we have.

As personal computers become more and more commonplace, more and more people have come to appreciate that quality. Our commitment to providing a product that's beyond compromise assures a product beyond compare. We like to think of it in a simple phrase that bears repeating: It simply works better.

COMPAQ Portable Computers have the ruggedness and durability for almost any work environment.

The Authorized COMPAQ Computer Dealer Network
For sales and service, there are over 2,200 worldwide.



Authorized COMPAQ Computer Dealers are carefully selected by a special review process. We make sure they are established business professionals with the expertise to provide technical service for every COMPAQ Computer they sell. Dealer technicians receive rigorous training by COMPAQ engineers.

No matter whether you're a professional on the move, or an international corporation with branch offices in dozens of states and countries, you'll find help readily available.

When you purchase your C Computer, you'll be buying fr best in the business. Authoriz COMPAQ Computer Dealers hard to earn your respect. Beca had to work even harder to ea

Authorized COMPAQ Computer Dealers, U.S. and Canada

A-Com-Plus
A-VIDD Electronics Company
ABACUS Computer Center
Agriplex Computer
All Things Computers
Allied Computer Centers
Amerisource
The AMS Computer Store
The Answer
Applied Data Systems
Arends & Sons Inc.
ASAP Computer Products
Bamberger's
Bandstra Computer Center
Basic Computer Shop
Bell & Howell
Blumberg Photo & Sound
Blumenthal's Computers
Businessland, Inc.
Byte Shop
C.C.C. Computer Center
C.T.I. Business Products Center
Calculator and Computer Center
Carolina Computer Store
Casterline Computer Center
CBM Computer Center
Central Computers
Central Valley Computer Center
Century Microcenters
Champlain Computer Systems
Chester Inc.
Cincinnati Computer Store
Clancy-Paul, Inc.
Command Performance Computers
Compco Computer Centers
Compu Group
Compu Net Computer Solutions
Compucentre
Compumark
Compumat Micro Center
CompuShop Inc.
Computer Applications Business Center
Computer Center of Boca Raton
Computer Center/Palm Beaches
The Computer Centre
Computer Concepts
Computer Depot
The Computer Edge
The Computer Factory
Computer Gallery
Computer House
Computer Innovations
The Computer Learning Tree
Computer Nook
Computer Plaza
Computer Pro
The Computer Room
The Computer Shoppe
Computer Solutions
Computer Source Inc.
The Computer Store
Computer Superstores
Computer Systems Resources
Computer Systems Specialists
Computer Techniques
Computer Town
Computer Trends International
Computer Utility
Computer Ware
Computer Works
ComputerCraft
COMPUTERease
ComputerLand
Computers Unlimited
Computerware
Computerworks
Computique
CompUtopia
Comuni-Center South
Connolly Data Systems Inc.
Contact Office Automation Centers
Custom Computing Systems
Data File, The
DATAGO
Data Systems of New Jersey
Data Terminal Mart
DRA Computer Center
Endata Business Products Cntr.
Entré Computer Centers
First National Computer Center
Forsythe Computers
Future Information Systems
Future Systems
Future Visions Computer Store
Garland Mears Irrigation
Gateway Computer
General Microcomputer, Inc.
Hamilton Computer Business Centre
Hamilton Rentals
HLA Computers
ICA Business Center
Ideal Computer Systems
Idex Business Computer Center
Illini Microcomputers Inc.
Illinois Valley Computers
Inacomp Computer Centers
Inacomp Computer City
Infomax Computers
Information Connection
Interdynamics Data Systems
International Computer Systems
J.W. Kerns, Inc.
Jonathan's Computer Center
Khalix
Le Magasin Xerox
Legacy Computer Systems
Lexington Computer Store
Light Computer Centre
Logic Tree Computer
The Logical Choice
Lyceum Computers
M.C.W. Computers
Maken Computer Services
The Math Box
MBI Business Center
Micro Center
Micro Mart
MicroAge Computer Stores
Microcomputer Solutions
Micronic Computer Centre Ltd.
Microsource/Financial
Mida Corporation
Midwest Computer Center
Miss-Lou Computer Center
Moore Business Centers
Morris Decision Systems
Mr. Micro
MSC Computer Store
Nabih's Inc.
Neeco of Needham
Northbrook Computers, Inc.
Office Management Systems Inc.
Olsen Computing
Omni Computer Center
Omnifax Computer Stores
Online Computers Plus
PAX Computer Center
Personal Business Comp
Personal Computer Cen
Personal Computer Inst
Photo & Sound Compar
Pittsburgh Computer S
Prodigy Computer Cent
Professional Computer
Professional Computer
Quantum Computer St
RAC Computers
Rainbow Computing In
Sears Business Systems
Sherman Howe Compu
Silver Creek Computer
Snyder Computer Cent
Societe Parmic Limitee
Solutions Inc.
Southwest Automation
Spectrum Computers
Star Business Compute
Sun Computers
Taskforce Business Cen
Universal Computers
Valcom Computer Cent
Varsity Computing
Wabash Computer Syst
Waldec Computer Cent
The Xerox Store

COM

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TECHNOLOGY

Computer Fingers Criminals

An advanced fingerprint identification system puts technology on the side of the law

In the late '50s, an older man in San Francisco was robbed and beaten to death in his apartment. Last February, 27 years later, detectives using a state-of-the-art computer system for identifying fingerprints zeroed in on two drug addicts as the culprits. "The suspects are still alive," says San Francisco Police Inspector Ken Moses, "and the guy who lifted the prints is still alive, so there's a good chance that we can make the charge stick."

This is just one of innumerable cases that illustrate how NEC Information Systems' Automated Fingerprint Identification System (AFIS) has revitalized criminal investigations in San Francisco. "The system gives investigators the motivation to go after prints like they never did before, because the payoff is there," Moses says. "They come back and solve cases that never would have been solved before." In fact, two new assistant district attorneys have been hired just to keep up with the increased caseload.

Joseph Phillips, NEC's national manager for fingerprint systems, refers to San Francisco's database of 1 million fingerprints as a "large system." But it is about to be eclipsed by a much larger statewide system NEC is installing for California's Department of Justice (DOJ).

Although the DOJ has used a fingerprint computer since 1980, Kirby Vickery, manager of the state's Latent Print Program (latent prints being those left at the scene), reports that "we've pretty much maxed out the capability of that system." For instance, the existing database has no room for fingerprint records from the state's six southern counties—including Los Angeles—even though crimes in these counties represent 40 percent of the felonies in the entire state.

The $22.4 million NEC system that will become California's CAL-ID project is faster and more accurate than the one that has proven so valuable in San Francisco. Moreover, the new system will have room for the 45 million fingerprints currently in the state's paper files. To understand how CAL-ID will work, first consider the intricacies of the task it handles.

As even the ancient Egyptians who "signed" certain objects with thumbprints knew, no two fingerprints are exactly alike. Since the turn of this century, police and forensic experts have relied on this fact in solving crimes. The crucial identifying characteristics of a fingerprint are its *minutiae*—those small details that mark the endings or splittings of individual ridges. In other words, every fingerprint is unique not so much in the shape or number of its ridges as in how these ridges begin or end, and it is exactly these details that AFIS is designed to recognize and match.

NEC, sometimes referred to as the AT&T of Japan because of its technological prowess, has employed several state-of-the-art techniques in assembling AFIS. Charge-coupled-device (CCD) image scanners provide perfect point-for-point transfer of actual images into high-resolution color graphics. Pipeline processing—similar to parallel processing techniques (see May 1985 *Popular Computing*, page 35)—makes it possible to search a database containing tens of millions of prints in a reasonable time. And laser optical discs give investigators at remote locations the advantage of actually seeing any print in the state's central files.

Previous fingerprint identification computers have relied on an algorithm developed in the late 1960s by the FBI and the National Bureau of Standards. Essentially, this algorithm locates the identifying minutiae and determines their relative positions. NEC's new system builds on this technique in that it also counts the ridges between one minutia and its neighboring four minutiae, an embellishment made possible by the greater processing powers of the hardware's custom VLSI chips and pipelining architecture.

The net result of this advance is much greater accuracy, especially when it comes to partial or distorted prints. In an ideal situation, when a complete 10-print card (that is, a card containing carefully made impressions of all of a person's fingertips) is compared with a database of millions of prints, the NEC system finds an exact match 99.5 percent of the time.

When California's equipment is fully operational, three types of hardware will be working together. The front end—that is, the primary interface for using the system—is a powerful minicomputer with a specialized CCD reader that scans and digitizes a 10-print card in about 25 seconds. This reader is coupled to a color monitor that displays the image at a resolution of 720 by 512 pixels with up to 256 colors.

But the most significant capabilities of this input monitor depend on its graphics tablet and stylus, which enable the operator to manipulate the fingerprint image for enhanced clarity. While this is not crucial for accurate reading of well-produced 10-print cards, it becomes extremely valuable for reading smudged or partial latent prints often found at the scene of a crime. Indeed, the input monitor will even automatically highlight areas it has difficulty reading, as if it were asking the operator for more to go on.

With the stylus and tablet an operator can touch up a print from a

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arred fingertip if it appears that he ridges on either side of the scar hould be connected. The operator an also enlarge by 500 percent a rint that is smudged or superimposed on other confusing images and hen make a clean tracing of its idges and minutiae. This cleaner mage is then reduced and fed into he system.

The minicomputer input system lso performs the complex digital apping of the minutiae, their relaionships, and ridge counts. Once the ngerprint has been reduced to digital values, it transferred via cable or elephone to the second ype of hardware used in he system, a NEC mainrame. Thanks to high-peed telecommunications, aw enforcement agencies round the state can uickly and easily tap in- the central database.

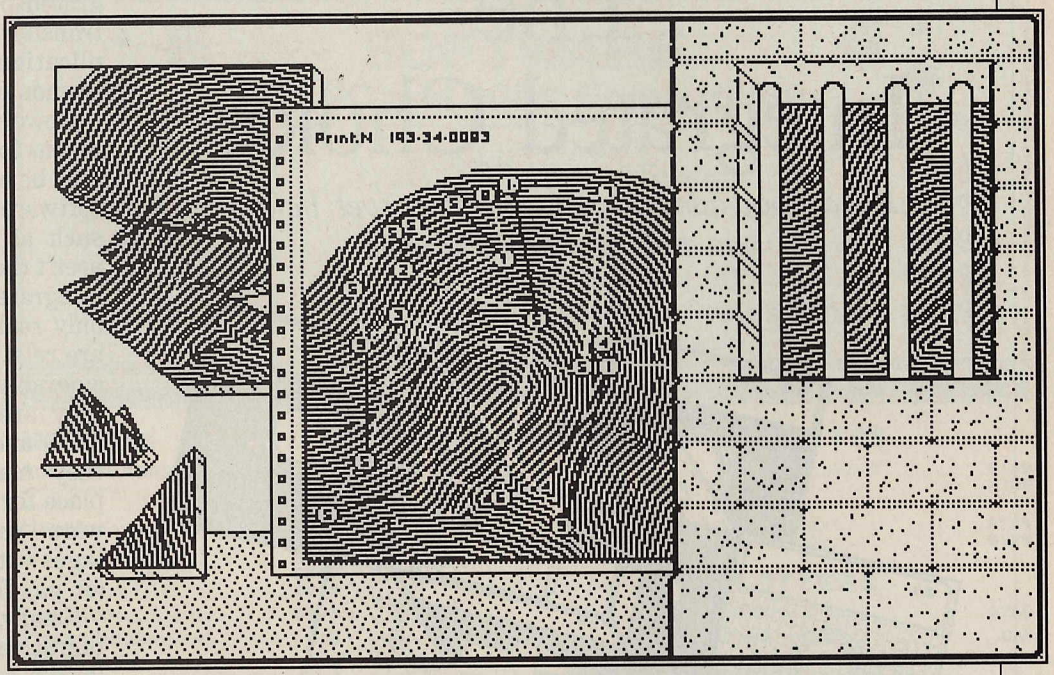
As in manual fingerprint earches, a technician opating the central mainrame can tailor the datapase on a search-by-search basis. For example, if the ase involves rape, prints rom females can be exluded. If a robbery victim letermined the assailant was white, other races ould be eliminated. Knowng the general type of fingerprint r particular finger also narrows the ange of prints to be searched. The bility to factor in specific criteria ields faster results in these cases.

To search the database, AFIS reies on a number of ultra-high-speed omputers that are pipelined—conected in such a way that their proessors work in concert. A single rocessor can compare the search rint to 650 file prints each second, nd as NEC's Phillips says, "If you want to search faster, I'll sell you nother computer." California's installation will employ 18 computers, iving it a potential searching speed f more than 12,000 prints per econd.

Both NEC and California's fingerrint experts are quick to stress that he computer doesn't actually idenify the fingerprints. The result of a database search is not a conclusive "this is the guy you're after" but rather a collection of potential matches ranked in order of probability according to the number of minutiae relationships, directions, and ridge counts that match the search print.

Once the system supplies this list of potential matches, a forensic specialist would bring some human expertise to bear by manually comparing the actual images of the potential matches to see if a positive identification could be made. Because officials at remote sites would not have access to the actual fingerprint cards, NEC has developed a third type of hardware for making the final visual identification. California's file of 45 million fingerprints will be stored on approximately 70 laser optical discs, each of which has a capacity in excess of 1 billion bytes. These are not the digitized minutiae maps used for matching but rather the actual images taken from 10-print cards.

Thus even at a remote site a technician can call up the fingerprint images pulled from the database and compare them with an unidentified latent print on a 14-inch monochrome monitor. If greater detail is needed, a high-resolution printer can provide larger-than-life hard copies of the displayed images.



As you'd expect, none of this is exactly inexpensive. The front-end minicomputer that reads prints and creates the digital minutiae maps costs about $200,000. The verification terminal, used to compare the latent prints with those in the database, runs about $20,000. Because these terminals alone would exhaust the budgets of small law enforcement agencies, a bill was introduced in the California legislature last January that would provide matching funds to help local agencies buy into the system.

What effect will all this new technology have on law enforcement in California? Officials are quite optimistic, citing not only the system's accuracy in comparing 10-print cards made under ideal circumstances but also its potential for "cold-make" searches (in which a latent print is the only clue) like the one that turned up the two drug addicts in the 27-year-old homicide case in San Francisco.

For an indication of just how effective AFIS can be, consider these statistics. Before its system came online, the San Francisco Police Department solved about 60 cold-make searches per year, according to Inspector Moses. But in February, with 11 months experience on its system, the department had solved 950 such cases, and Moses expected

ILLUSTRATIONS BY JOHN CRAIG

to reach 1000 before the first year was up.

As has been the case in San Francisco, the DOJ's Vickery expects a dramatic impact on criminal justice throughout the state once the automated system goes on-line. "CAL-ID has been designed with state-of-the-art computers to make cold-search identifications. We are going to identify a lot of criminals," says Vickery confidently. "In five years we're not going to recognize the way prints are being utilized. It's opening up a totally new field for us."

—LINDSEY MCWILLIAMS

Lindsey McWilliams is a freelance writer in Arcata, California.

BUSINESS

The Integrated Choice

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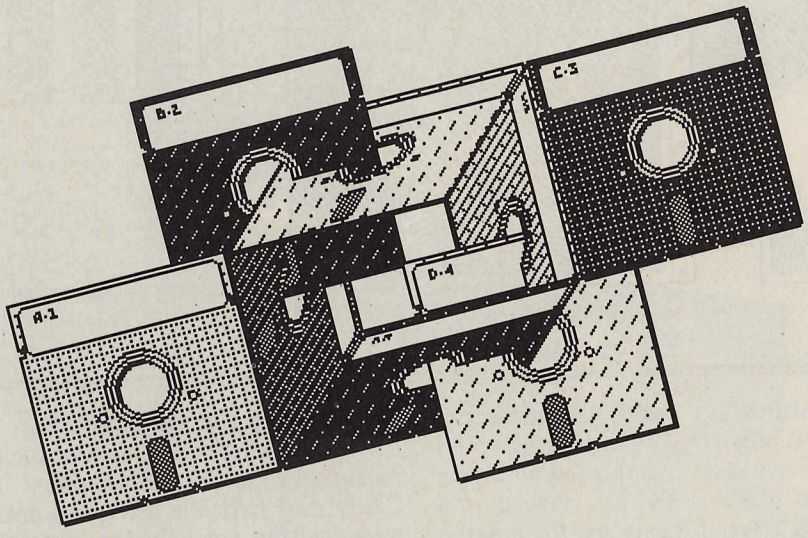

When you're deciding whether to invest in integrated software, begin by thinking back to why you bought a personal computer in the first place. Was it the lure of control over your rag-tag accounting records that grabbed you? Or did you yearn for the ability to write hundreds of customer letters with little effort? Maybe it was using a spreadsheet—the magical tool that has sold untold numbers of small computers.

Now look at how you are actually using the little beast and note what pleases you. While you're at it, think about where your computer system has let you down—even the things that make you angry about its performance.

My guess is that you will *not* say: "I was looking for a way to improve my writing, financial analysis, graphics presentations, data management, and telecommunications." Yet that's exactly what most integrated software packages offer. And you're encouraged to believe that this is the best way to fly because it's "state of the art." Well maybe so, or maybe it's just a software fad. In any case, being up-to-the-minute is less important than getting a measurable return on your personal computer investment. So let's step back from the hype and do some careful thinking about what integrated software has to offer.

Lotus's 1-2-3 kicked off the integrated software trend almost three years ago (for more details on integrated software and the industry, see "When Less Is More" on page 52). When users began to covet even more functions in a single package, the industry responded with a flurry of complex, expensive systems comprising at least five applications. The distinguishing feature of today's integrated packages is their ability to transfer data and files between applications without leaving the bounds of the system.

However, there are also other means to the same end. Some of you may be considering another class of software called desktop organizers, such as Borland's Sidekick. Why aren't these programs referred to as integrated software? Beats me—the only real differences are that they are relatively less capable and considerably less expensive. Because they are cheap (generally $50 to $150) and simple to learn and use, they make an excellent starting place for exploring integrated software—you get a taste of the advantages without having to sit through (or pay for) a full banquet.

Finally, we're beginning to see "integrative" software systems, also known as operating environments. Much-ballyhooed examples are IBM's Topview, Microsoft Windows, and Digital Research's GEM. These are umbrellas that allow you to assemble your favorite individual programs and make them operate as though they were an integrated package.

At least that's the theory. In practice, things don't work this smoothly. Each of these environments offers its own set of constraints, and you may not be able use all of an environment's advantages with a given set of programs. Some stand-alone programs will have to be extensively modified to become Topview, GEM or Windows aware (current terminology for whether a program will work with an environment). Also these environments are new and suffer the inadequacies of most software in its first incarnation.

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With these general options in mind (and the delights and pet peeves about your system that you came up with earlier), let's examine the factors to consider before you decide to go integrated. Cost and hardware requirements are fairly obvious and objective, but we'll also look at the subjective concerns you'll have to weigh in light of your own needs and wants.

You can argue the typically high cost of an integrated package either way. As a single purchase, such a system is expensive, but compared to the cost of five stand-alone programs, an integrated package is cheap. Both of these extreme perspectives beg the question of value, though. Are you sure you want all the functions included in the integrated software you're considering? In other words, how much of this major purchase is (or will be) valuable?

On the other hand (and there's always another hand when it comes to software), you may discover the power of an application that you tried only because it was sitting there in the integrated package waiting to be used. A friend who bought Framework primarily for its word processing and outlining has since been thrilled to find out what the spreadsheet can do for him.

Beyond the cost of the software itself are inevitable hardware considerations. I have yet to see an integrated package I would consider for daily use that operates efficiently on anything less substantial than a computer with 512K bytes of memory and a hard disk. Some vendors claim that their integrated packages will run on a floppy-disk system with less than 256K bytes of memory; I'd suggest that you borrow a copy of the software and use it for a week rather than blithely assuming that these vendors are right.

Integrated software is, by nature, complex stuff. It takes a heavyweight hardware set-up to support all but those programs that don't do very much or have punishingly slow performance. Whether this is terrible news or not depends on your situation. Upgrading an IBM PC from 256K to 640K bytes of memory currently costs around $400. Adding a 10-megabyte hard disk now costs as little as $600. But because both of these hardware enhancements make major improvements in overall system performance (not just the ability to run integrated software), they are well worth considering.

However, upgrading to a hard disk means some reeducation. Usually, you'll need to move up to a newer version of your operating system or at least learn a whole stack of new commands for the hard-disk requirements. Beefed-up operating systems offer more, yet they create a new layer of overhead in your crowded mind. I know many IBM users that are doing quite well, thank you, with "antiquated" versions of PC-DOS and stand-alone applications programs. It would take a nuclear explosion to move them toward more complex versions.

THE IDEA of integrated software is seductive—having all your needed applications in one place is like having all your tools in a single toolbox.

So you'll want to ask yourself if you really need a hard disk with the attendant operating-system upgrade. One integrated software vendor I know looks at shoppers with a straight face and says a dual floppy-disk environment is just fine. If you buy the package on the basis of that claim, you're in for a shock when you open the box and find eight floppies inside (that's just for the program—wait 'til you have a few data disks as well). Operating this package on a floppy-disk system is marvelous training if you want to be a blackjack dealer in Las Vegas, but I wouldn't recommend it to anyone trying to get some work done.

Next, look at the learning curve for the integrated package itself. After trying a number of these programs myself, I'd say that you can expect a learning investment two to four times as great as with the typical stand-alone program. That's why there are so many books and training courses on the market for the popular integrated programs—anything to flatten the learning curve.

You may conclude that this investment is more than justified by the fact that you're learning how to handle five (or more) functions at one time. That's true, and it's also true that it all comes at one time: before you even start using any of the functions. If there's an urgent need to get up and running right away, integrated software may disqualify itself for this reason alone. Finally, remember that these complexities are there every time you use the software. For occasional computer users this is a significant minus.

Integrated software vendors make a lot of noise about how "common command structures" ease these learning problems. That's only partly true, and it depends on the way the package is constructed. Even if functions share a lot of the same commands, it's not possible to use all the same codes because there are things you want to do when building a graph that aren't consistent with database entries or word-processing machinations.

In short, integrated software works best for people who do lots of different things each day. This ideal business generalist isn't too common, however. For those of us who spend most of our time pursuing one or two tasks, well-suited stand-alone programs seem a better choice.

Yet the notion of integrated software is seductive. Having all your software in one place is like having all your tools in a toolbox: you don't have to run all over the place hunting for the screwdriver, wrenches, and hammer you need for a repair job. I'm most intrigued by the emerging operating environments that, at least in theory, will let you put all your favorite software tools in one kit. Unfortunately, they're

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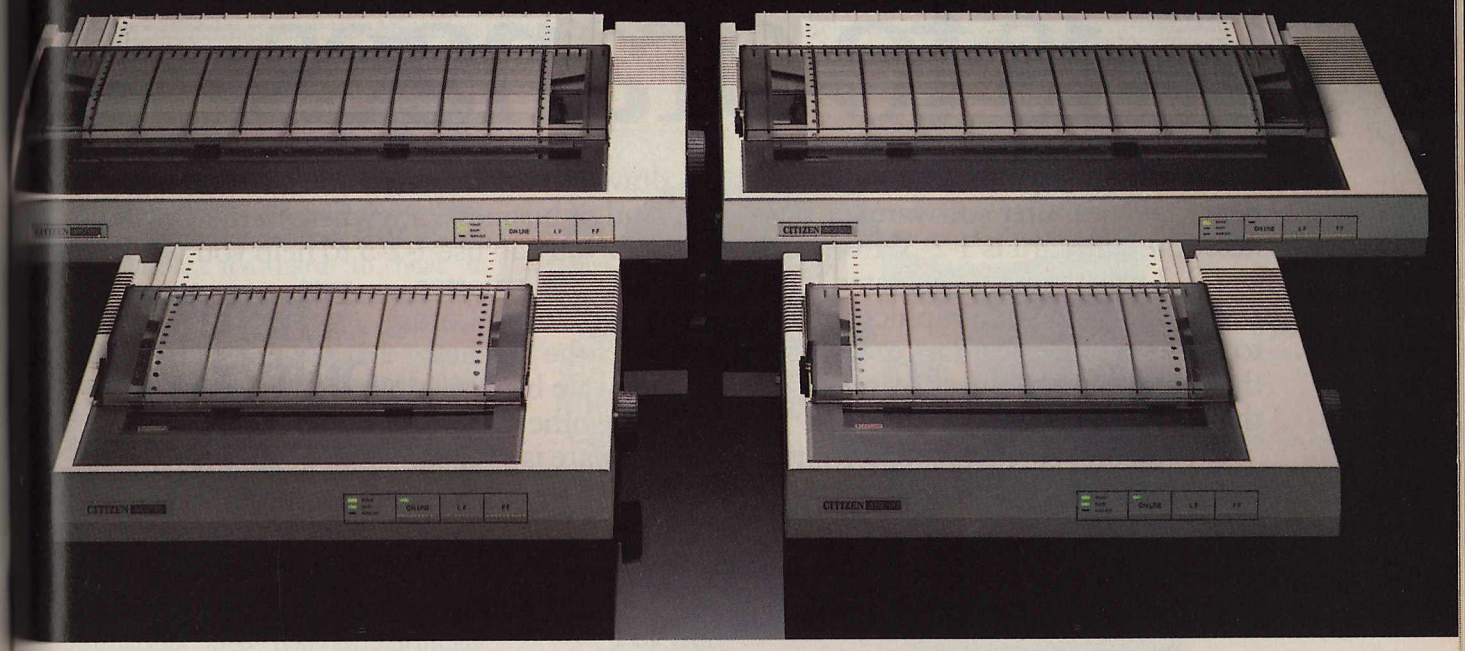

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still too new to recommend, except to people who come from the Indiana Jones school of personal computing.

The best compromise for most people right now is what we might call small-scale integration—that is, stand-alone programs that have grown to encompass other functions while not demanding additional hardware. Let's look at a few examples (more to let you know what I'm talking about than to push specific products).

If you spend most of your time muscling numbers on an IBM PC or compatible, it's hard to beat a spreadsheet-based program like Sorcim's Supercalc 3 (version 2) or the ubiquitous 1-2-3. Supercalc is better, based on sheer performance, but 1-2-3 is more widely used and boasts a larger collection of add-on programs. Word-oriented people should look at word processors with built-in spelling checkers as a minimum. Some packages also offer telecommunications facilities, and a few, such as Select Information Systems' Freestyle, give you an outlining function integrated into the word processor.

Apple II users should find Appleworks a good choice. It includes basic writing, file management, and spreadsheet support in one inexpensive bundle. While none of the separate functions is particularly strong, the package does a lot with a computer of this performance class.

Machines like the Commodore 64 and the older Ataris (the new, powerful Atari STs are another matter, but it's too soon to judge them) are just too limited to accommodate useful integrated software. It's smarter to use stand-alone programs if one of these is your only hardware alternative.

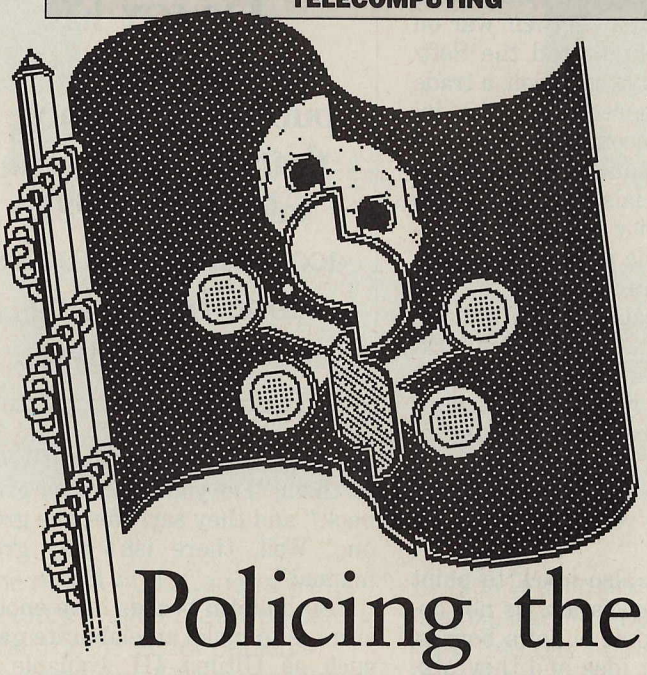
Apple's Macintosh is almost an integrated system in itself, but companies have recently announced integrated software for it. Once again, be wary of performance—the standard 128K Mac is surprisingly slow even without the addition of integrated software's substantial overhead.

If all this leaves you feeling confused, I'll make one simple recommendation: buy an inexpensive program that will give you the sensation of software integration so that you can accurately assess the potential of this approach for your own needs. Try Borland's Sidekick, Electronic Arts' Get Organized, or Noumenon's Intuit (a capable integrated package for the incredible price of $89.95). You'll find it easy to put any of these programs to work, and while they may not turn out to be the final answer to integrating your applications, at least you'll get a feel for what all the fuss is about. That alone is probably worth your time and a hundred bucks for the software.

—RICHARD DALTON

Richard Dalton, an editor of the newsletter *Open Systems: Managing Office Technology*, heads Keep/Track Corp., a San Francisco consulting firm.

TELECOMPUTING



Policing the Boards

The Software Publishers Association puts the squeeze on pirate bulletin boards

It was almost Halloween—a perfect time for Activision to make a big splash with its new game based on the hit movie *Ghostbusters*. But the game package had barely reached the stores when the company discovered it had already been "slimed."

While Activision was asking computer owners to pay $39.95 for its game, software pirates were passing it out for free. "We discovered that the game had been posted on a bulletin board," said Smith McKeithen, Activision's vice president and general counsel. Computer users who had the board's phone number and a valid password could pick up the program for the cost of a phone call and a blank disk.

Activision is by no means the only victim of such piracy—quite a few illicit boards support the activity. While the folks who offer such "midnight software" may envision themselves as great equalizers in the mold of modern-day Robin Hoods, to software publishers they are simple thieves. And the software companies are not just irritated—they complain that piracy, together with the electronic networks that support it, has become a major threat to the survival of the industry.

Future Computing, a market research firm specializing in the computer industry, estimates that piracy has cost software publishers more than $1 billion in sales since 1981. The firm recently concluded that at least one pirated copy of popular business programs exists for every legitimate copy, and software publishers are certain that the duplication rate for entertainment software is even higher.

Last fall, software publishers opened a new front in their war on piracy. They empowered the Software Publishers Association, a trade organization representing the interests of microcomputer software publishers, to team up with law enforcement officials and telephone company security forces in an attempt to pull the plug on the 1200-baud buccaneers.

The SPA, located in the nation's capital (Suite 1200, 1111 19th St. NW, Washington, DC 20036), has taken its new responsibility very seriously. "We're not interested in scaring people," says Kenneth A. Wasch, the association's executive director. "We're interested in convictions."

But Wasch is also quick to point out that the association "is not opposed to electronic bulletin boards. They're a great idea and they promote the use of computers. On the other hand, we believe pirate boards that regularly post copyrighted software to be downloaded violate copyright laws and interstate fraud laws. That kind of activity will be monitored, and those perpetrating it will be prosecuted."

Early in the campaign, the SPA was effective in shutting down a board in upstate New York. Later, it obtained a cash settlement from a West Coast bootlegger who was selling stolen programs through his own 20-page catalog. Activision's McKeithen said he's not sure the effort will solve the problem, but at least it's a start. "You can't prevent all fires," he said, "but you have to have a fire department."

Another supporter of the crackdown is Robert Garriott, president of Origin Systems, maker of the fantasy game Ultima III. "I would say half the copies of our games are pirated, and that's only because they're fantasy games. If they were arcade games, the figure would be maybe 75 percent," he said.

Garriott supports this claim with some rather cunning informal research. "We know there are a lot of pirated versions of Ultima out there because we get a lot of calls from people who say they lost their manual," Garriott explains. "We say to them, 'Do you mean the green book?' and they say, 'Yes, the green one.' Well, there isn't any green manual."

PIRACY has deprived software publishers of more than $1 billion in sales since 1981, according to studies done by leading industry analysts.

Few bulletin boards have enough storage to make an elaborate game such as Ultima III available for downloading. But that doesn't stop the pirates—many boards offer step-by-step instructions for using bit-copying programs to duplicate the disk, and others post notices from individuals who want to swap copied disks through the mail.

That's the sort of activity that troubles Nicholas A. Ulanov, chairman of Millennium Inc., a company that publishes youth and adult learning games. "Computer bulletin boards are wonderful and exciting," says Ulanov. "What they are doing is truly the wave of communication of the future. But what is clearly illegal should not be encouraged in a public forum."

One problem for the SPA, however, is that what is illegal is not always clear. Offering pirated copies of copyrighted programs is clearly illegal, and posting notices from those who want to trade pirated copies is tantamount to dealing in stolen goods. But those boards that do nothing more than post instructions for breaking copy-protection schemes fall into a gray area, according to Wasch. Some states, including California, Florida, and Arizona, have strong laws against what is termed "publication of methods." But in many other states, those involved in the same activity would be virtually impossible to prosecute.

Despite such statutory fuzziness, Wasch reports that the association is getting increasing help from federal authorities and from telephone companies that want to stop the distribution of bootleg billing and credit card numbers through on-line bulletin boards. "There is a convergence of interests among telecommunications companies, credit card companies, software publishers, and the FBI," Wasch says. "The illegal use of bulletin boards has grown so much that this is no longer a problem of minor pilferage."

For instance, the FBI no longer insists that software theft total at least $1000 before the agency gets involved. Moreover, federal prosecutors, particularly those around Los Angeles and San Francisco, are eager to pursue software copyright violators. Although legal precedents are just now being established, Wasch says that "we're already seeing much closer cooperation" between the victims of piracy and the law-enforcement agencies whose job it is to nab the pirates.

In addition to citing the simple illegality of piracy, Wasch argues that computer users who patronize pirate boards will eventually hurt themselves by discouraging innovation and lower prices. "I don't believe that every pirate copy of a program is a lost sale," he says. "But I do believe that organized pirates—people who distribute and download software—have a major effect on software sales. And the easier it is for people to get software for free by phone, the less new software will be developed."

Wasch explains that he doesn't expect system operators to check their boards every hour to be sure nothing illegal is posted. Rather, the SPA's

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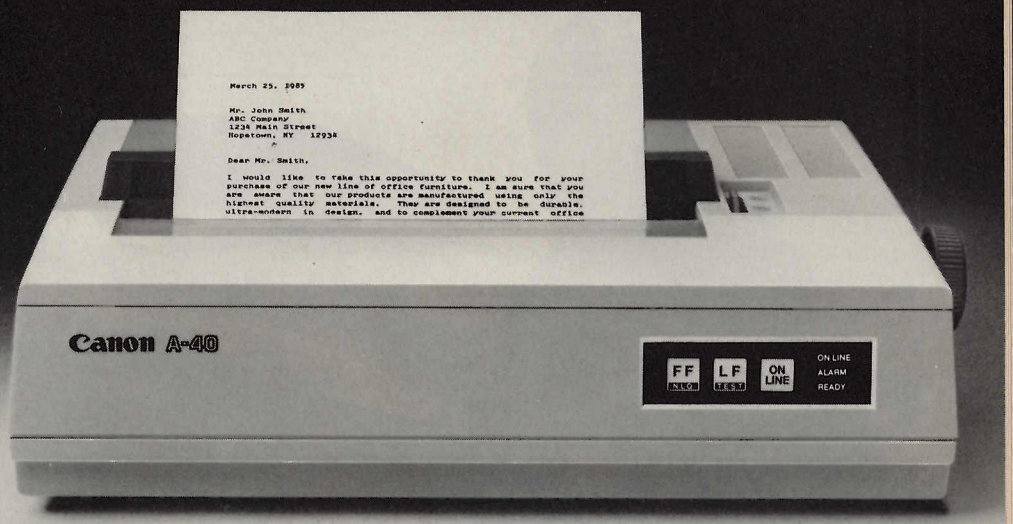
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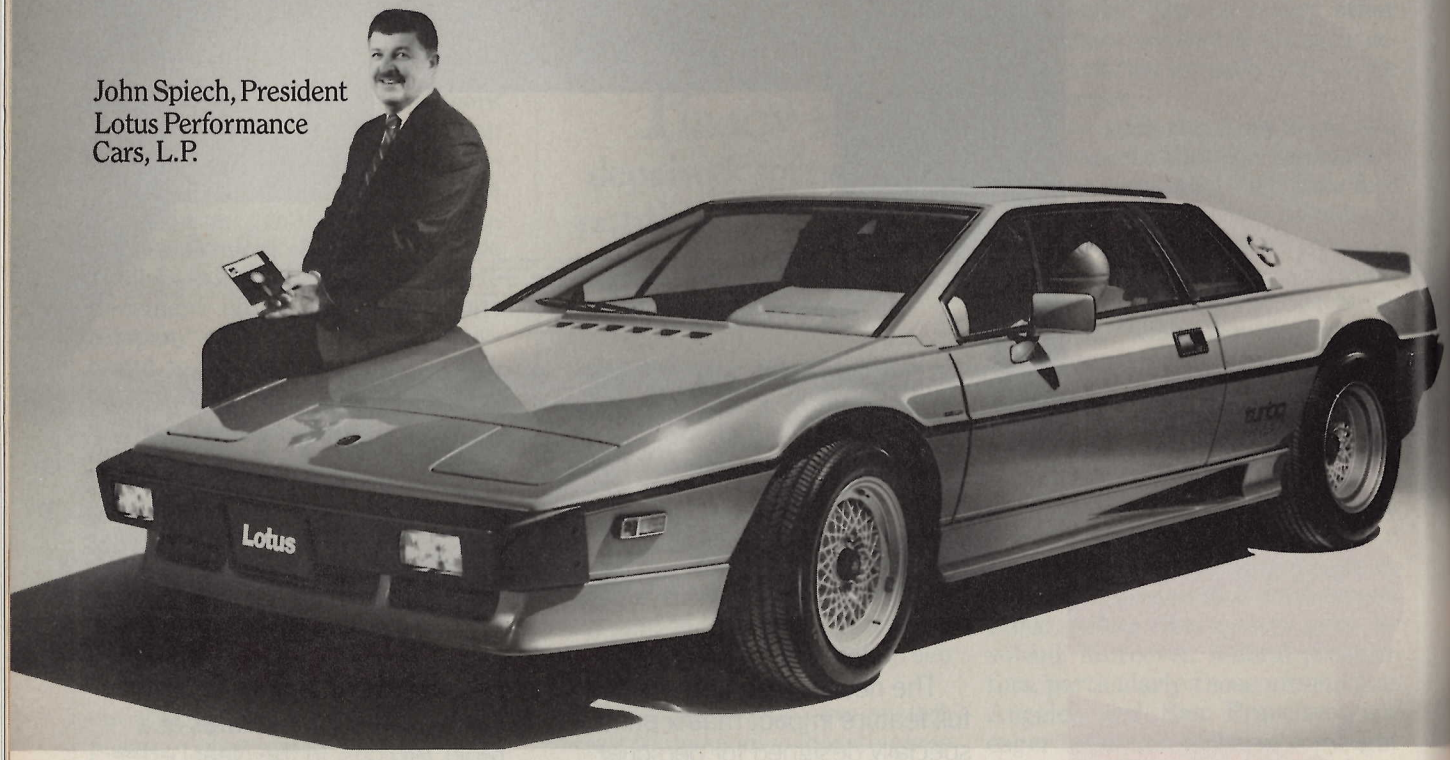

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Inquiry 3

targets are boards that openly cater to piracy and copyright violations. As Wasch puts it, "Our message is, don't become an accomplice."

It's doubtful that the Software Publishers Association can ferret out every pirate board and put them all out of action. But another tack may be even more successful. Wasch says that the SPA plans to set up a telephone hotline to receive reports about the operation of pirate boards. If the sysops in charge of "clean," legitimate boards use this avenue to put pressure on those who are giving bulletin boards a bad name, the pirates may find themselves left high and dry. —RIC MANNING

Ric Manning publishes *Plumb*, a newsletter about bulletin boards and telecommunication services. He welcomes electronic mail on The Source (STQ007) or Compuserve (72715,210).

AT LARGE

Computing in the Real World

One teacher's innovation gives students a taste of authentic applications

It's just a few minutes after 8 a.m., but room J-8 at Lexington (Massachusetts) High School is already buzzing with activity. Some students are talking in groups; others are working at a dozen Apple IIes and II Pluses spread out around the edge of the room. The teacher is hard to find, but the students are clearly helping each other.

"To save your file use Control-C," says a large, bearded student in jeans and sweatshirt, leaning over the keyboard of a petite, well-dressed young lady with inch-long fingernails. "You're going to have to reboot," sighs one young woman to another whose screen has just gone blank. "What should we ask about handicapped parking?" wonders a serious young man as he and two fellow students collaborate on the design of a data-entry format. From the center of the room a student shouts "Who's got Visicalc?" to nobody in particular.

"Here it is," says instructor Alan November. He has just emerged from a corner where he helped two students save their files and move off the computer they'd been using—one of only two machines with printers—so that a third student can print out a draft of a paper she's written. "Some days I feel more like a traffic cop than a teacher," November sighs.

November's class is called Computers and Society. It is an innovative tool-based computer-literacy course in a high school whose students were among the first in the country, 15 years ago, to program their own minicomputer. But this course involves no programming. Its students work with Visicalc; PFS: File, Report, and Graph; Applewriter; and other productivity software to learn what computers do in the real world. And to give their work some meaning beyond the academic, the students pursue projects that benefit their community in very real ways.

The course requires no homework and involves little academic pressure, but November says that some students willingly stay after school to finish lengthy projects. The opportunity to serve the community, along with "the pride generated by using the computer as a professional tool," gives them the extra impetus "to continue working at projects until they succeed," November explains.

For instance, one young woman with a chronic attendence problem gave up five days of her vacation time to finish a database listing the services of more than 100 agencies for handicapped people in the greater Boston area. The results were distributed to the agencies in book form through a grant from Boston University, and the listing proved so valuable that the agencies now want to make it statewide.

Not all of the projects undertaken in Computers and Society involve community service. In fact, students start out by applying the computer to their own interests. I watched one girl write a "Dear Abby" column in which she invented a series of personal problems and created solutions for them. Another designed a computerized order form for her after-school business, selling cosmetics door-to-door. A boy was building a fantasy database of military robots: "Name: SPEC-1; Type: Speedster; Cost: $100 billion; Origin: SPEC-1 was created during the late 1990s as a messenger robot after World War III . . ." Another student used Visicalc to create a numerical ranking system for his favorite professional football players. Off in a corner, a pair of students worked on a simple animation project while learning to use a graphics program.

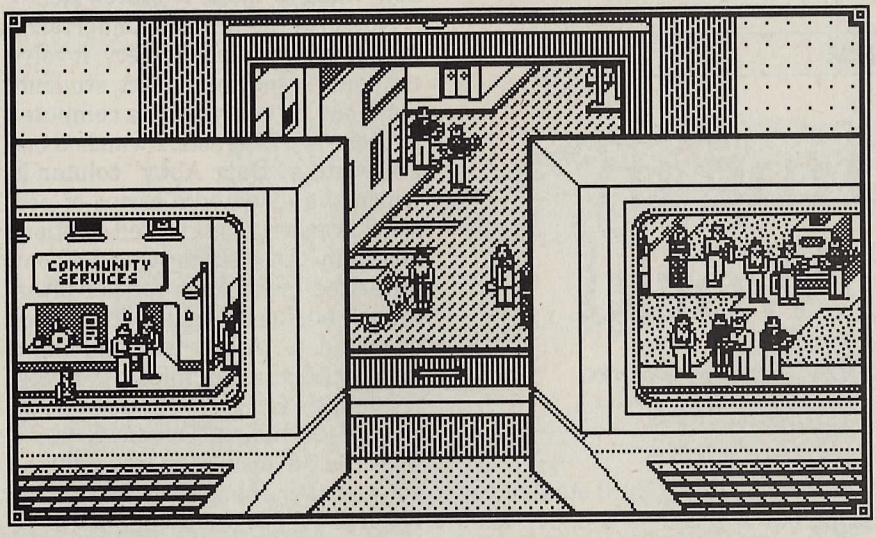
"Working on personal interests gets the kids involved with the computers. Then they are required to move into community projects," November explains. Projects underway on the day I visited included a compilation of all the services available for children in the town of Lexington, a file of after-school job opportunities culled from the *Boston Globe*, a listing of college scholarships available to Lexington students, and a survey of wheelchair access undertaken to help the town apply for funds to build sidewalk ramps.

While Computers and Society certainly deserves the attention of other teachers of computer science, it has also created an environment that is the envy of educators in all subjects. "This course builds students' self-esteem. Success comes to every individual, regardless of academic background," asserts Novem-

ber. Also, perhaps because there is not such a premium on individual academic performance, November's students really do help each other.

"One student is our graphing expert. Another specializes in form letters. Each student is expected to lend his or her expertise to anyone who needs that particular skill," November says.

Ed Goode, chairperson of Lexington's Information Science department, applauds this aspect of the course. "Peer teaching works here because it's essential in this lab situation. What's been added is the relevance of the projects to the students," Goode explains.



So what's the catch? Why doesn't every school institute this sort of course? Well, just for starters it demands a special kind of teacher—one who's willing to teach without a textbook and learn along with the students. A psychology teacher before he got into computers, November began developing his course two years ago after hearing a computer consultant complain that people in schools didn't really know how computers were being used in business. So he bought an Apple computer and taught himself to use Visicalc.

"My colleagues said 'What are you going to teach if you don't teach programming?' I said I didn't know yet but I'd figure something out," November recalls. "I wrote a course description, took it around to all the lunchrooms in the school, and asked the kids if they liked what it said. Then I kept rewriting it until it sounded right to them. When 88 kids signed up for the first round, everybody was very surprised.

"I started the course with only a little knowledge of Visicalc. I didn't know about word processing or databases or graphics yet, so I learned with the students," November says.

One big difficulty facing November and his students is the lack of consistency in hardware and software. The 12 Apples in his lab boast two different keyboards (Apple II Plus and Apple IIe), different amounts of memory (64K bytes and 128K bytes), and either one or two disk drives. An even bigger snag is that only two of the machines have printers. With this setup, November spends much of his time helping students figure out which software will run on which system and asking students to move from one machine to another to accommodate others.

And then there's software compatibility—or the lack of it. Each piece of software has its own way of doing things, so students who don't take careful notes can easily get confused. Few students attempt the complicated process of transferring files from one application to another—and who can blame them?

November dreams of replacing his present lab with a set of 256K-byte MS-DOS machines networked to a hard disk. "Then we won't have to worry about disk and file management," he explains. "A kid won't lose his work because his files will always be available on the hard disk. And with integrated software, we won't have to monkey around in order to load files from one program into another." But the biggest advantage November sees is that on-line help functions built into the software for the more powerful machines will make things much easier for both teacher and students.

Technical difficulties aside, November's biggest educational challenge is helping students find their own problems to work on. "What good is it if we teach kids a body of knowledge—how to use Visicalc, for instance, which some of them learn to do very well—and it turns out that they don't know how to apply it? In most disciplines, we never even ask them to apply it. That's why it's really important that they come up with problems on their own," he continues. "Often they'll look at me and say 'What does a problem look like?' I tell them that their grades depend on thinking up their own problems. I also tell them that they can help each other, but that I'm not going to help them," he says.

November has also found that his students have difficulty recognizing data when they see it. "At first, they don't really understand that a record store or a football team can be thought of as a pile of data. The whole process of thinking about information, about how it can be organized and accessed with these tools, requires a special mind-set."

Although modest about his role, November has clearly fashioned an environment in which students learn real-world skills at the same time that they learn about themselves, their peers, and their place in society. By taking the youngsters seriously and relying on them to help each other, he leads them to an understanding that goes far beyond mere technical competence. By encouraging students to identify community needs and then develop projects that answer those needs, a course like Computers and Society may hold the key to education in the Information Age. —DAN WATT

Contributing editor Dan Watt is coauthor of *Teaching With Logo* (Addison-Wesley, 1985).

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Taking on the IRS

Using a computer is the best way to prepare for an IRS audit—or is it?

I recently received a letter from my least favorite correspondent: the Internal Revenue Service. It was my least favorite kind of letter. It began, "Your Federal tax return for the above year(s) has been assigned to me for examination. Because I need additional information to verify certain items reported on your return, I would like to meet with you . . ."

The time was about eight weeks away, and the location was my office. The items I was expected to have ready for my inquisitor's scrutiny included every possible shred of information concerning my taxes for 1983, the year for which the IRS had decided that my Form 1040 raised some questions that would not be put to rest until a representative from that agency paid a personal visit to look into the matter.

The fact that I am an honest citizen, the kind of American who fulfills his tax obligations as fairly as he can determine, did not stop me from going into an immediate panic. As I spilled my anxiety to my friends, they were quick to respond with tales of tax audits they have known. Invariably these case histories resulted in the financial, and often total, ruin of the audited parties. My friends began to address me with the beyond-hope winsomeness one might overhear in a hospice.

The possible consequences were dire because 1983 was a year in which I had a huge amount of business deductions, largely generated by travel and other expenses involved in writing a book. If these expenses were disallowed, my tax liablity, as the letter so coyly put it, would be "changed." I had prepared the return myself without aid of accountant; because I'd been busy doing the book, I had not taken a whole lot of time with it. But I had done it honestly! The problem was, how could I let the auditor know how honest I had been when my own documentation consisted largely of a bunch of receipts in dirty brown envelopes?

Then I remembered. I had a weapon. *My computer.*

Now, I have never been a fan of those computer programs that promise to figure out your taxes for you. I have yet to see a computer program dig through the bottom of a drawer and come up with an airline receipt. On the other hand, I am a true believer in the computer's ability to organize data. And that's what was called for in this case. Organization. Documentation. Or, as the IRS had broadly hinted in its dismaying missive, *Substantiation.* I would take the mess of receipts, canceled checks, credit card chits, and on-the-fly appointment-book notations and transform them into records on a database program, which I would then present to the auditor. Astonished at my veracity, the auditor would immediately certify me as an impeccable citizen. A credit to my country!

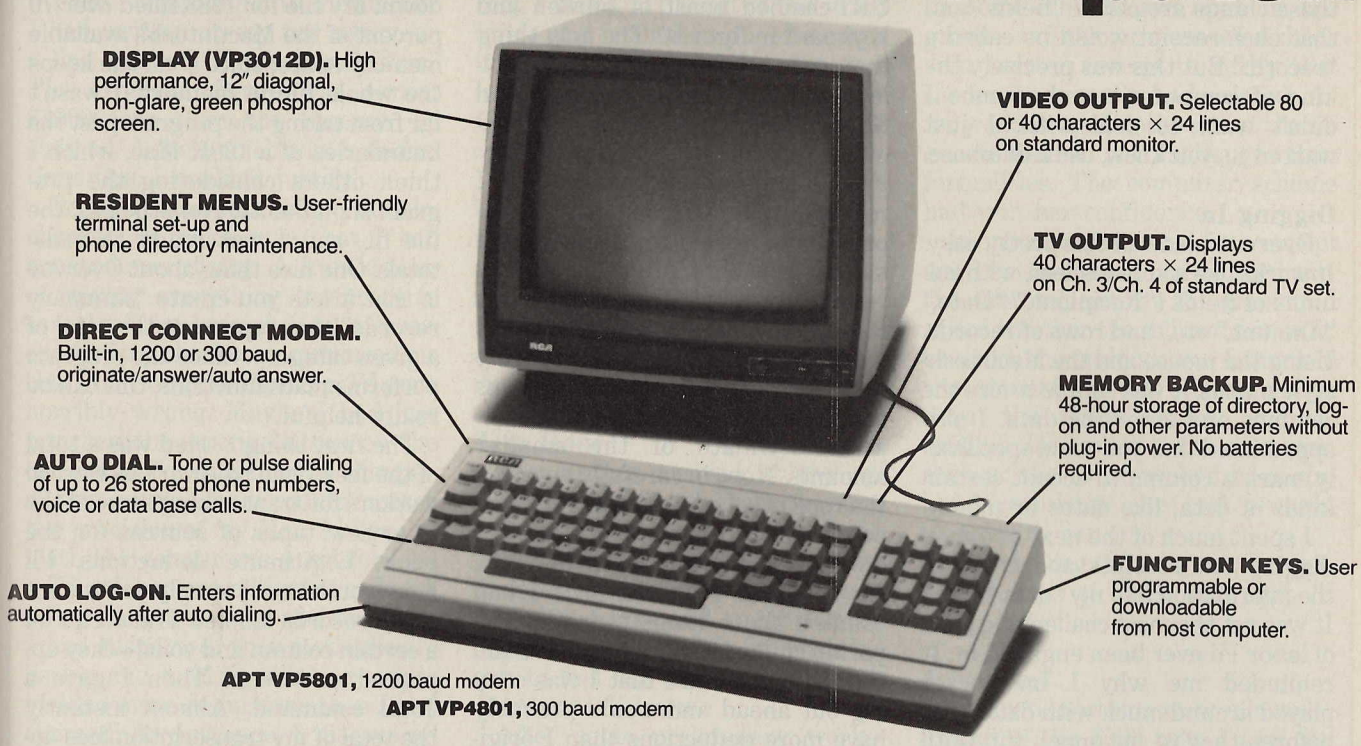
Unfortunately, I was not exactly a master of databases. However, I did have on hand a database called Overvue, which its publisher (Provue Development Corp. of Huntington Beach, California) describes as an "information manager for the Macintosh personal computer." I'd seen it demonstrated at a computer show, and it looked fairly easy to get into. Good thing, because I didn't sit down at the machine until a few days before the audit.

What I wanted was something that would let me enter each expense, note what the expense was, what kind of expense it was, when it was incurred, whom I paid, how I paid it, how much I paid, and in which dirty brown envelope I would look if I wanted to come up with the

Steven Levy is a contributing editor of *Popular Computing.*

ILLUSTRATION BY PETER DE SEVE

You don't need a computer to talk to another computer.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actual hard-copy receipt. I know that these things are called "fields" and that each receipt would be called a "record." But this was precisely the kind of computer mumbo-jumbo I didn't want to deal with. I just wanted to, you know, use a database.

Digging In

Overvue made all this pretty easy. It works like a spreadsheet, with columns of fields ("Recipient," "Date," "Amount," etc.) and rows of records. Using the mouse and the Macintosh-style menus, it was simple to size the columns and enter the data. I also appreciated that you could specifically mark a column to accept certain kinds of data, like dates or money.

I spent much of the next two days digging out receipts and entering the information into my "data sheet." It was not the most challenging form of labor I'd ever been engaged in. It reminded me why I had never played around much with databases before—they're not much fun until you put the information in them, and who wants to sit there like some CRT-chained beast of burden and keyboard in figures? The only thing that made it bearable was a good collection of tapes on my Walkman, and the fact that I was doing it for my own survival.

As I entered the information, I realized that this methodical approach was yielding deductions I had overlooked in preparing my tax return. My original approach, when faced with a huge pile of receipts in a certain area, had been to roughly total the larger amounts, perhaps making what I considered a conservative estimate of the smaller amounts. Now, in carefully entering the receipts, I noticed that some expenses had more than one receipt—a credit card chit and an invoice slip, for instance. I wondered if I had counted those items twice in preparing my original return. Overall, though, I was sure that I was coming out ahead and would probably have more deductions than I originally had claimed.

Finally I had all the information down. My file for 1983 filled over 70 percent of the Mactintosh's available memory space; since Overvue keeps the whole file in memory, I wasn't far from taking the program past the boundaries of a 128K Mac, which I think others considering the program should note. Nonetheless, the file fit, and I was ready to make totals. One nice thing about Overvue is that it lets you create "summary records" that represent the total of a given category. Since the program performs math functions, this can be really helpful.

The first thing I tried was a total of the fees I had paid various clerical workers for transcribing some of the interview tapes of sources for the book. Legitimate deductions, I'll have you know. I simply sorted out those records labeled Transcript on a certain column and voilà!—they appeared on-screen. Then I gave a Total command. Almost instantly the total of my transcription fees appeared. I felt great.

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Time to Panic

Then I compared it to the amount I had written on my tax return on a line marked "Professional Fees." The Overvue figure was almost $1000 less than the amount I'd claimed. A thousand bucks in deductions that I couldn't justify!

Trying to maintain calm, I double-checked to make sure that I had counted everything. A frantic hour of ripping everything to shreds in search of lost receipts and a cross-check of my checkbook convinced me that in my original figuring, I'd gone horribly wrong. Maybe I had just punched the wrong button on the calculator I'd used to total things—all that hurried input couldn't match the precision of my Mac. I began to loath the computer's precision.

This all became mitigated as I added up the other areas and found, as I had suspected, that methodically listing and totaling all the receipts yielded more deductions than I had claimed; for instance, I discovered that I'd undercounted my travel-related deductions by hundreds of dollars. So even counting the horrid situation in the transcription department, I could legitimately substantiate well over $500 in deductions besides those on my return.

This was all dependent, of course, on the IRS agent's ability to interpret the tax laws in the same light I viewed them. What if, for instance, the audit was selective, and the agent wanted to concentrate only on certain areas—like, say, transcription fees? And then would look at my oh-so-well-documented travel fees and sniff at them, insisting that some of the time *must* have been for vacation. ("Look at the book!" I'd say, shoving a copy of the 450-page *Hackers* at her—"Do you think I did this *on vacation*?")

While mired in considering that scenario, I realized the danger of using a database: any discrepancy is instantly available. If I just tossed the dirty brown envelopes at the auditor, she might never discover that tiny little error. What were the chances she'd sit down and total those things up? If I followed my plan to usher her to a waiting Macintosh displaying my finances, she could not possibly miss that mistake—and it might well convince her that I was a tax fraud of the worst kind. And from then on, she would interpret each deduction not as a legitimate expense under Schedule C but a vile attempt to undermine our tax code.

My internal debate—should I use the database or not in this audit?—went on almost until the moment the auditor arrived. I decided to go ahead. Really, there was no way I was going to waste two boring days of typing information into a database, even if it led to my ruin.

Zero Hour

The auditor arrived at the appointed time, as pleasant a young woman as you'd ever want to meet, under different circumstances. She dragged some sinister-looking forms out of her case and suggested we begin immediately. My internals began to feel like Albert Finney's in *Under the Volcano*.

After some preliminary work—mostly examining my bank accounts to make sure I wasn't funneling unclaimed income to Switzerland—she turned to the part of my return that had intrigued the IRS so deeply—my deductions. It was then I made my move. "Maybe it would help," I said, "if I showed you what I have on the computer."

The Macintosh had been on the whole time. I clicked open the Overvue file marked "1983," and my deductions, in neat rows and columns, materialized on the screen. We both admired them.

"They're all here?" she asked. I nodded. "You have them broken down by what kind they are?" Yes. "You have receipts for these?" I pointed to the column that identified which dirty envelope held the hard-copy proof. I thought that I saw the shadow of a smile on her face, but I wasn't sure. I gave her the mouse.

"You work it," she said, handing the mouse back.

Before we started, I explained the little problem with the transcripts but assured her that the total deductions would come out in my favor. She seemed to accept that explanation, and for the next hour we played with Overvue. I would select a category of expenses, and they would appear on the screen. She would point to some—the larger ones in the group—and ask for a canceled check or a written receipt to verify that the expense really had existed. As we went along, I noticed that the requests seemed less challenges than formalities. The computer scheme had won her confidence.

In one case, she asked for a receipt and I noticed that I had claimed only the subtotal, not the full amount. I asked whether the full amount could be used, she nodded, and I changed the amount on the screen, pulled down the Math window, and re-totaled. She looked at the computer, then at the overmatched book-size hand calculator she had brought along with her.

"We're going to have portable computers soon at IRS," she said. "I can't wait."

A Victory?

All my deductions were allowed—including the $500 that I had discovered during the input sessions. As it turned out, using the computer had made the audit much less arduous. When I was chatting with the auditor before she left, she told me that whenever someone shoves a stack of receipt-laden shoeboxes at her, her impulse is to check every last one of them, down to the penny, questioning each. But with everything available at a glance, she could get a clear picture of the scope and nature of my claims.

So using the Macintosh to cope with the audit was a fine idea. But in the process, I had a sobering experience that still troubles me. It happened while transferring my financial picture to the computer. I was entering each item by the kind of expense it represented, and when I had everything in the computer, I decided to arrange the items by the date of the expenses. In two seconds, there it was—January 1 to December 31, my entire year. As I scrolled down, I could easily identify not only the times I had gone out of town and where I had gone, but what I had done, the books I purchased, the hotels I lodged at, the lunches at which I interviewed sources, the phone calls I placed . . . a virtual diary, with detail that came into

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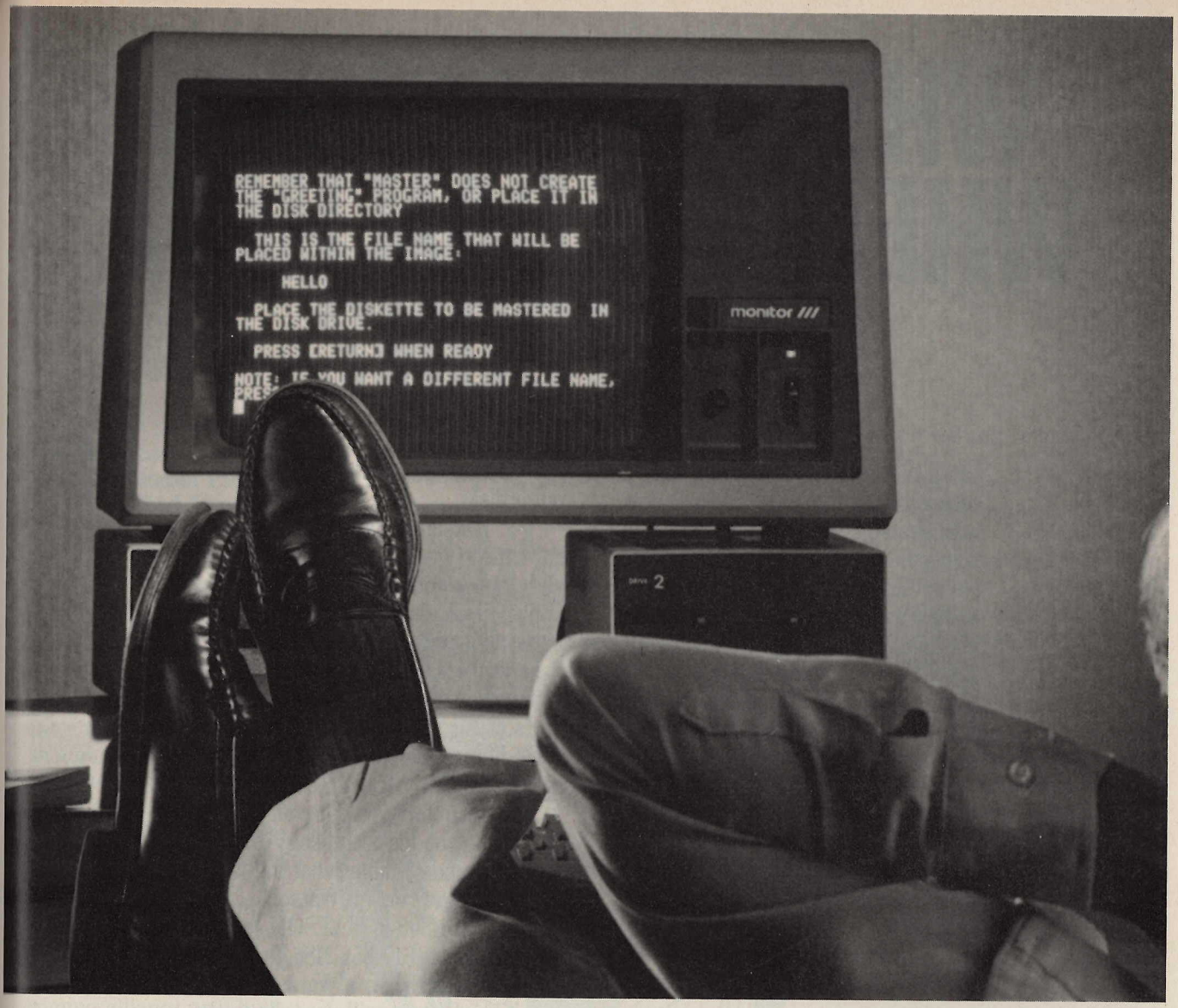
I realize that this is the kind of thing that privacy advocates have been warning us about for years. But I had always taken comfort in the fact that the various information stored in computers, though certainly private, is usually stored in incongruous files in different computers. As a person who has tried to get a Model 100 to talk to an Apple II, I'm sure that it would be no picnic to get the American Express computer to speak to New York Telephone's computer and work in conjunction with a few dozen others to provide a complete printout of my activities. Someone would have to really *want* to do it.

Yet here I was, compiling my own dossier. And it was devastatingly revealing. As a result I am more than a little nervous about efforts taken to set up a system where more big computers could communicate with each other and the kind of detailed file I had constructed for myself could be available to anyone.

I would hate for my next tax audit to occur in some computer center, with the auditor calling my information up and analyzing it—all without my knowledge, because I wouldn't be needed to provide "substantiation." It would all be there in my computer record. Yet this is the direction in which we are heading. And in my own small way, I felt that I had contributed to this in painstakingly placing my complete financial picture in a database.

Despite this, I'll keep using the database for my finances—it has proven to be a significantly better way to do things, and I've learned that it's worthwhile to have that organization and verification handy. But I also acknowledge the trade-off involved in the process—what we do for convenience may lead to terrible consequences later on. It is the Faustian bargain of the computer age, and I hope that it never comes crashing down on us. ☐

Steven Levy welcomes your comments and suggestions. You can contact him on The Source (ID TCT670) or Compuserve (ID 72065, 635) or by writing to him c/o *Popular Computing*, POB 397, Hancock, NH 03449.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Inquiry 55

Consulting the Oracle

If you ask the right questions, you can get good advice from your computer

We tend to treat computers like oracles. This isn't necessarily bad. In ancient times both statesmen and business executives consulted oracles. There were a lot of them to choose among, from the gang down at the local laurel grove to the much better known outfits in the capital city. Everyone knew, though, for the real goods you had to go to the cave at Delphi and consult the Pythoness, otherwise known as the Priestess of Apollo.

Of course, you couldn't just waltz into the cave and ask. A politico hoping to find out about an upcoming alliance or a businessman looking for advice on a trading venture still had to follow the standard procedure. That included walking slowly up the (steep!) Sacred Way performing rituals like hand washing at each station; and of course all were expected to bring gifts.

Eventually the supplicant would make it to the entrance, be led down into the cave, and get to see the Pythoness. For most of the shrine's existence this was a nervous young woman. She would listen to the question, get a good whiff of the sacred vapors coming out of the earth, and babble something. Usually the customer wouldn't understand a word she said, but there was always a squad of priests to interpret.

That's how the consulting business worked in those times. Today if we remember anything about the Delphic oracle at all, it's likely to be how ambiguous the prophecies were. For example, Croesus, the richest man in the world, paid a small fortune to have the Pythoness tell him what would happen if he invaded Persia. "You will destroy a great kingdom," the priestess babbled. He invaded, and when the smoke cleared he discovered he certainly had destroyed a great kingdom, his own.

That sort of thing couldn't have happened too often, else how could Delphi have been the Arthur D. Little of ancient times? After all, we may know more facts than our ancient Greek ancestors, but we're not really smarter than they were, and smart people won't pay for riddles when they need specific advice. The Delphi company must have done something right pretty often, or they couldn't have stayed in the consulting business.

In fact, the oracle usually did give good advice. Questions asked at the shrine generally fell into three broad categories: religious-moral, political, and commercial. They could handle them all.

The staff at Delphi were the best theologians around and never had trouble with religious and moral questions. Commercial questions weren't much harder. Delphi was central headquarters for the best intelligence network of ancient times. The firm had acolytes and junior priests in every country and most cities. In addition, each traveler to Delphi was routinely questioned on conditions not only back home but also in every country and city he'd come through on the way.

Delphi also collected information on what happened to their customers. After a while they had good records: good enough to draw maps from. The maps were primitive, but they were a *lot* better than nothing. The records also gave the usual travel time from one place to another and when the stormy season began. It was no wonder, then, that a commercial trader asking if he should ship wine to Libya or tin to Smyrna was likely to get good advice. Mediterranean weather is reasonably predictable from spring into fall, and the merchant would have

Science fiction writer Jerry Pournelle, who joined the micro revolution eight years ago, is a contributing editor of *Popular Computing*.

ILLUSTRATION BY ELLIOT BANFIELD

the benefit of the latest market and road conditions reports.

Political questions might be a bit trickier. Greece in those days was a crazy-quilt patchwork of small independent city-states, some of which had complex but real emotional and historical ties of friendship (or hatred) with each other. Governments changed like dreams. Monarchs were overthrown by oligarchs, oligarchies became democracies, democracies fell under the spell of tyrants, states conquered each other or gained independence. Diplomats were often treated as spies, and there was no regular diplomatic service. Once again the Delphi intelligence network gave the priests a hefty edge.

They also weren't above making things happen: if they knew Athens would make alliance with Platea against Thebes because they advised it, they had a pretty good handle on what to tell Platea and Thebes when their representatives showed up bearing gifts.

Every now and then, though, the Delphi consultants got questions they really couldn't answer. Since they supposedly had a pipeline to Apollo, they couldn't admit the question was too tough. That's when the riddles came out. By and large, though, the oracle at Delphi had the best advice around, and consulting the Pythoness made perfectly good business and political sense.

Computers as Oracles

Things haven't changed all that much today. There are more oracles competing for your attention (and gifts). Some of the questions can get pretty complicated. Still, most business executives need advice that has clear analogues to the kinds of questions their ancient counterparts took to the Pythoness; only today, they expect "the computer" to supply the answer—and there are all too many "experts" ready to supply misinformation at a high price.

Now, as then, you can ask for advice from dozens of sources. You can even try to gin it up yourself. In classical times you had to travel far to consult a famous oracle. Today you can do it in the privacy of your own home, either by modem or through a number of programs that claim to simulate business and political systems.

In olden times there weren't many privately owned oracles—certainly not as many as there are personal computers today—but they did exist. You might think of a personal computer and business simulation software as a classical merchant might have thought of a resident soothsayer who'd been trained (at the merchant's expense) at Delphi. Whatever else the soothsayer learned, you can be sure he was taught at least this: if the advice is useless, little more than random output, be sure to wrap it thoroughly in ritual and poetry. If you have nothing worth saying, quote Homer.

ANYONE with a computer program that could really predict stock market trends wouldn't have to sell computer programs for a living.

The Real Problem

Still, you can't live without computers. They do give an advantage. Now, as then, if you ask the right questions, you can get good advice from an oracle, oops, personal computer; and if you blindly follow advice given in response to the wrong questions, you're headed for disaster. Clearly, then, the key problem is to identify what kinds of questions are appropriate to ask a computer and which are not.

However, it's useless to ask most people in the business of using computers for advice. Unless they're selling software, they'll probably advise you not to do it yourself. (O sir, this question is far too important to entrust to your resident soothsayer.) Those that do sell software may say bad things about a competitor (O sir, you *didn't* consult the temple at Corinth?). Even so, they'll be careful lest they give the whole soothsaying business a bad name; and the reasons given for avoiding one or another computer program may not be very useful. (The Corinthians don't follow accepted practices. They wash both feet in the same basin.)

In fact, though, there is no question so monstrously inappropriate for a computer that someone with powerful credentials as an expert won't devise, and heavily hype, a program to "answer" it; as witness some of the psychobabble programs on the market.

The best way to attack the problem is in reverse. Let's first look at a question that computers *can't* answer.

They Can't Do That!

First and foremost: no computer can accurately predict stock or commodity market trends.

That should be obvious. Computers can't do it because people can't do it. Anyone who had a computer program that would *really* do a significant job of predicting market trends wouldn't have to sell computer programs for a living. Moreover, if such a program did appear, it couldn't possibly work after a lot of people got hold of it because they'd stop acting the way they used to and now start doing what the program said to do, and that would spoil the predictions. (The theory of "the efficient market," which assumes that all useful information quickly becomes available to, and influences the decisions of, all the investors is now the economic rage.)

Computers don't understand the world any better than people do. There is no valid theory of the stock market. Several years ago a well-known financial publication chose a stock portfolio by throwing darts at the stock market report section of their newspaper; that portfolio has so far outperformed just about all of the major "high-growth" investment funds, including those managed with the aid of the largest computers.

Sterility and Spreadsheets

The most ubiquitous use of computers as oracles is in financial plan-

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ning. It's nearly impossible to get an MBA without using a spreadsheet. Everyone else has them, too.

The result is that companies consisting of, say, recent college graduate Artemesia Huddle, her little brother, and her college dropout fiancé can generate business plans and other financial documents that look more impressive than anything AT&T could have given you ten years ago.

Of course Ms. Huddle's sales projections are actually based on conversations her boyfriend overheard at a truck stop, and she got her overall economic forecast from an Ouija board, but that's all carefully buried in beautiful curves, graphs, and tables. I mean, how could a program with a name like Lotus lie to you?

But things are worse than that because the modern hard-nosed bottom-line MBA philosophy is fundamentally flawed. Let me give an example.

The aliens have arrived. They're friendly, but they want the Earth. However, they're in no hurry to collect. Here's their offer: every human on Earth will receive an income equivalent to $1 million a year. Robot factories will be installed to produce plenty of wonderful things you can buy with that money. Furthermore, all diseases will be cured and everyone will be guaranteed a life span of one thousand years.

There's one catch. After two thousand years, every human will be born sterile.

Assuming we believe the aliens can keep their promises, should we accept?

Every MBA I ever asked said no; but every MBA decision theory I ever heard of says we should.

Rule of thumb: if you don't know of an expert whose advice you would follow, the question is certainly not one to ask a computer.

Helpful Little Beasts

This isn't to say that computers can't be useful and even vital. Computers don't understand the world and can't help us in situations where no one has any expertise: but where such expertise exists, computers often can apply it better than humans.

Case in point. Computers are excellent for accumulating data and plotting past history. Unlike people, they have excellent memories. They're very good at going through complex data and finding the exceptional cases.

Most stock market analysts say that the successful stock traders (as opposed to brokers, who make money on commissions whether their clients get rich or go broke) study the individual stocks they buy. They know something about the companies they're investing money in; some reason why this or that company is undervalued. Sometimes that's specialized knowledge, analogous to the priests at Delphi hearing that Smyrna had lots of money but their regular grain shipment was sunk in a freak storm. Sometimes, though, the information is right out there for everyone to see but buried in a tangle of irrelevant numbers.

COMPUTERIZED databases can serve modern executives in the same way the Delphic oracle served merchants in classical times, but with much better results.

That's one use for computers, then: examining masses of data to find the interesting anomalies.

Computers are good at applying rules. People forget things. We especially forget exceptions. If you come up with a decision something like "sell if it goes over 37.25 unless Consolodated Dust has gone below 15.66, in which case offer no more than 44.50 for Amalgamated Mess unless oil had dropped below 26 dollars a barrel, in which case offer up to 51.25 but sell all my stock in Rigid Jawbone except for 100 shares because I want to go to the annual meeting, and don't sell Jawbone before March 17 because of the tax situation," a computer is *far* more likely to get it right than you are. Moreover, given present tax regulations such complex decision functions aren't so unusual, either.

A computerized database can serve a modern executive in the same way that the Delphi priesthood served merchants in classical times, but much better, because the computer doesn't forget anything. The information can not only be accumulated, but also organized to show trends. Computers can't make predictions until some human devises a theory—but the machine can often be useful in generating that theory. Just as some geographic features, such as really big meteor craters, are not visible from the ground and can be seen only from an airplane, some trends can't be spotted until vast quantities of data are lumped together in ways no one would ever have tried without computers.

Expert systems can be extremely useful. They work particularly well in bureaucratic settings, where the exact decision isn't too important, but getting things decided quickly is. Some companies have installed expert system programs to examine expense reports, applications for vacation, and other administrative matters. Mashing this data by hand is tedious at best, and doing it without mistakes is nearly impossible. Small computers *like* doing moving averages.

The Quest Goes On

The Pythoness at Delphi was in some ways more useful than a computer. If you went to Delphi for information, you were likely to get the best available. If you wanted moral advice, you'd do better than you will asking a computer today.

Otherwise, things aren't very different. Those who consult the right kind of oracles generally have a strong edge over those who don't—but asking the wrong questions has always been a good formula for disaster. □

Jerry Pournelle welcomes comments from members of the micro revolution. Write to him c/o *Popular Computing*, POB 397, Hancock, NH 03449. Jerry tries to answer all his mail but cannot promise individual replies.

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When Less Is More

Are integrated packages too big for their own good?

A year ago, the hottest trend in software publishing was integrated software. After Lotus Development Corp.'s phenomenal success with 1-2-3, it seemed as though software experts were betting that the big successes in the future would be expensive programs that combined all or most of the major applications of personal computers—word processing, financial modeling, file management, graphics, and communications.

You remember those days. We were all convinced that Lotus's Symphony, Ashton-Tate's Framework, or yes, even Ovation, was going to set the world on fire. It didn't happen. Symphony and Framework have sold a fair number of copies, but they sure didn't make anyone forget their manufacturers' earlier products. And Ovation never materialized.

The most popular integrated software package is none of the above; it's Appleworks, a very different type of program that combines limited-function word-processing, spreadsheet, and file management applications. So what happened? And what does this mean for software in the future?

Levels of Integration

First we need to define what we mean by integrated software, a term that has been used to cover many kinds of programs. On one end, we have *families* of programs created by the same vendor that share similar commands and are designed to exchange information with one another. Many companies have tried this route, though only two firms (Software Publishing and Microsoft) have been successful with business programs for microcomputers.

On the other end, we have *integrating environments*, which don't do anything in themselves, but rather let you run several programs at the same time in different windows while passing data back and forth. No integrating environment has yet taken off for the IBM PC or similar machines, though IBM's Topview, Microsoft Windows, and Digital Research's GEM still have a chance; such an environment is part of Apple's Macintosh, however, and is clearly a success.

But most of the attention has gone to *multiple-function programs*, software that combines several applications. This category was initially defined by 1-2-3, which combines spreadsheet, graphics, and list management features. More recent examples include Framework and Symphony, both of which contain word-processing, spreadsheet, list management, graphics, and communications functions. Though market analysts initially viewed these programs with great expectations, at least in the IBM PC world, they have not sold very well.

1-2-3's Success

But wait, you say. Isn't the most popular program for the IBM PC an integrated program? In fact, it's a multiple-function program: 1-2-3.

Well, 1-2-3 is undeniably a huge success; but perhaps that just points out the flaws in the definition. I'd argue that 1-2-3 is not integrated software in the same sense as Symphony or Framework; rather it's simply the world's most popular spreadsheet program (and isn't that enough?). Instead of trying to be all things to all people, it concentrates on providing specific help for people who spend most of their time building and analyzing financial models.

From this perspective, 1-2-3's ability to turn spreadsheets into charts doesn't make it a program for creating presentation graphics; it is still primarily an analytical tool. Similar-

Michael J. Miller is a West Coast editor of *Popular Computing*.

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ly, list management functions such as searching and sorting can be used for analysis of financial models, not just for traditional file management applications. Lotus's 1-2-3 may have been used to define multiple-function programs way back when, but now we can see that its real success has been as a spreadsheet with a lot of additional features.

Tightly Integrated Packages

Looked at this way, 1-2-3 simply gives financial users extra functions like sorting, searching, and producing graphs in the same way that programs like Wordstar Professional add mail merging and spelling functions to the traditional text-editing and document-formatting features. Though nobody considers such word-processing packages integrated software, they also combine features. Both the word-processing packages and 1-2-3 are examples of tightly integrated packages aimed, respectively, at two specific groups—people who produce documents and people who work with figures.

I'm convinced that the great majority of computer users spend most of their time with one major application—be it a word processor, spreadsheet, database, or something more exotic. Most users do not need all the functions of the big integrated programs, and they certainly do not want to sacrifice the functionality of their primary application. Besides, they don't need the bother of learning to use an extremely complicated program.

These people may still want some of the functions found in other types of programs, however. For instance, 1-2-3 users may need a notepad to scribble down some text, and Wordstar users might want a calculator to add up a few numbers every now and then.

Desk Accessories

Such users may find a solution in desk accessory software, those programs that remain in the background while you run other programs but appear at the top of your screen at the touch of a button.

Indeed, desk accessory programs such as Sidekick from Borland International (Scotts Valley, California), Spotlight from Software Arts (Wellesley, Massachusetts), and Pop-ups (also marketed as Deskset Plus) from Bellesoft (Bellevue, Washington) have been the unexpected software successes of the year. Such programs give you small applications—things like calculators, notepads, and appointment calendars. In fact, they are very similar to the desk accessory concept used by the Macintosh. They are easy to use and relatively inexpensive, costing from $55 to $130, compared to $500 or more for the most complex integrated packages.

> **THE GREAT majority of users do not need all the power and multiple functions of the expensive and much-hyped integrated software packages.**

To some extent these programs came as a surprise. Not the well-advertised and highly promoted products from bigger firms, they came instead from smaller firms with much less promotion money.

These programs offer a little bit of each type of the major applications—such as a notebook instead of a full-scale word processor, a name and address file instead of a complete file management program, or a calculator instead of a spreadsheet. But their capabilities are growing. For instance, T/Maker Corp. (Mountain View, California) already offers Click On Worksheet, a Macintosh accessory that gives you a small, 20-column by 50-row spreadsheet.

Just by covering the basics, these limited programs may lure many users away from the big integrated programs. And because they usually include some of the features of a clipboard to move information between applications, they may also end up competing with the integrating environments such as Topview, GEM, and Microsoft Windows.

Appleworks

Single powerful applications combined with desk accessories may indeed take the place of integrated software for all but the most sophisticated users, whom the industry now insists on calling "power users."

But what then explains the success of Appleworks? This combination of word-processing, spreadsheet, and file management functions was, in fact, the single biggest-selling computer program last Christmas. In part, that's because the program has the Apple name going for it, along with the firm's considerable marketing clout. But unlike the big integrated packages, Appleworks does not try to be a full-function solution in each of its applications. All three applications are more limited in Appleworks than they are in stand-alone programs.

So instead of going to either the power users or the mainstreamers who have one primary application need, Appleworks appeals to users who want to do a little of everything. That may encompass many people, but it does not make up the large business market that integrated programs were supposedly aimed at.

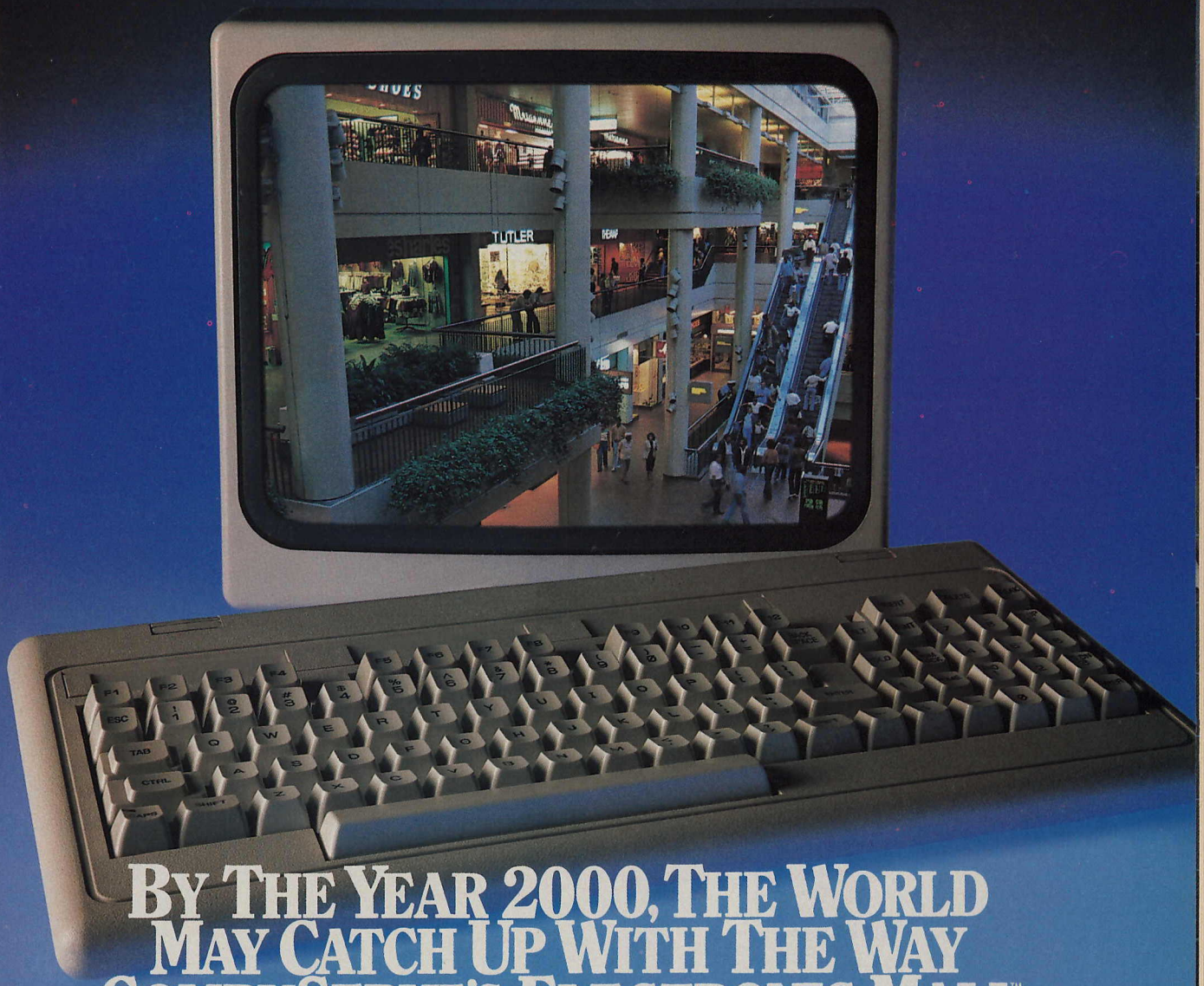
What We Need

As it stands, we have not one type of multiple-function program but several, and each is for a different audience.

The well-advertised, well-known integrated software packages like Framework and Symphony are for people who need full-function applications in several areas. The less versatile programs, such as Appleworks, are better suited for people who do a little of everything but not much of any single application.

For the rest of us, the great middle class of computer users, neither of these approaches is appropriate. What we need are exceptional programs in our particular application plus a little bit of the other functions. Thus tightly integrated programs along with desk accessories may be a better solution.

Now all we have to do is convince the software developers. □



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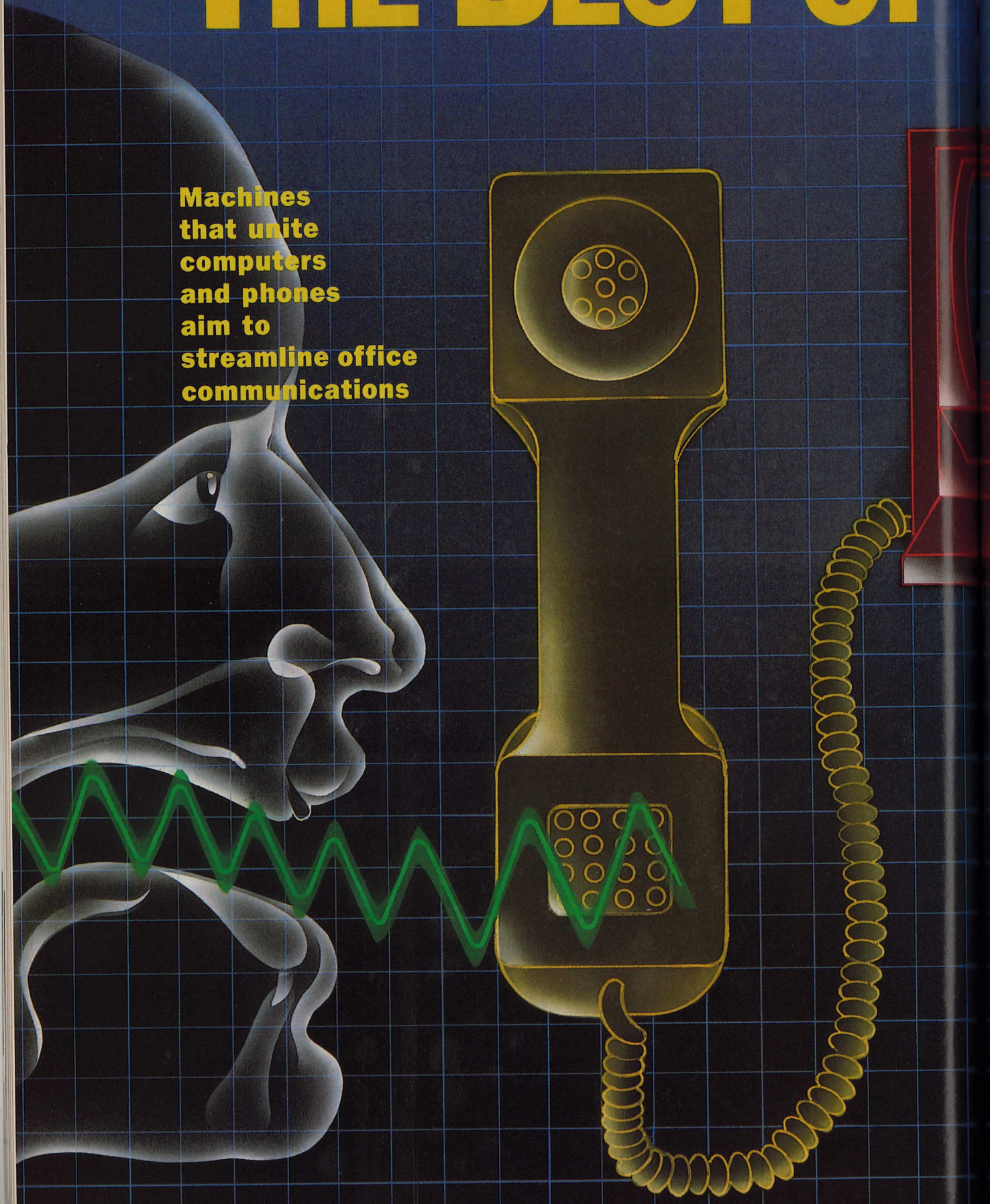
Inquiry 9

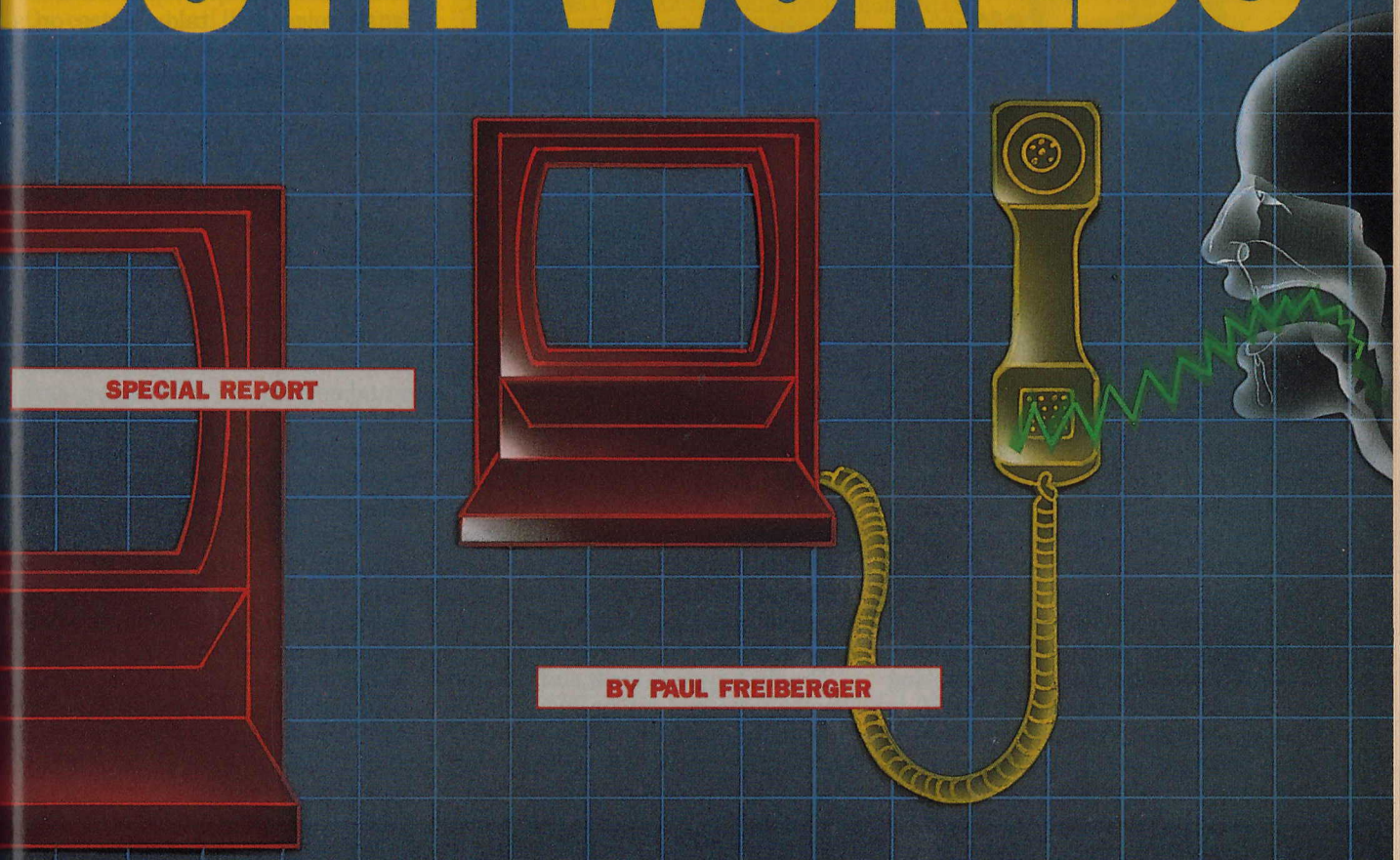
THE BEST OF

Machines that unite computers and phones aim to streamline office communications



BOTH WORLDS

SPECIAL REPORT



BY PAUL FREIBERGER

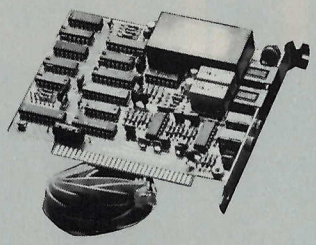
IN THE 1790s, the Viennese scientist Wolfgang von Kemplen constructed an elaborate machine for producing human speech. It consisted of a bellows with various levers and reeds, and it could generate connected utterances of surprising quality. But few people took him seriously. Von Kemplen had earlier built a chess-playing machine and enjoyed cheers all around until someone discovered it housed a legless chess master. Those were the days.

Interest in voice machines has been with us for a long time, and the computer has spurred it further. Although conversational computers are still a long way from the desktop, we now have machines that mediate conversations, acting as answering machines, phones, modems, and computers all in one.

It's a natural development—computers and telephones have been headed toward this fusion for several years.

ILLUSTRATION BY CAROL GILLOT

ADD-ONS WITH VOICE MAIL



VOICEMATE

Expansion board and software for IBM PC, XT, AT, and compatibles; requires 64K bytes of RAM; hard-disk drive recommended; $499. Soundtools applications software and expansion board; $499.
Digital Pathways Inc., 1060 East Meadow Circle, Palo Alto, CA 94303; (415) 493-5544

WATSON

Expansion board with built-in 300/1200-baud modem and communications and telephone-management software; for IBM PC, XT, AT, and compatibles; requires a minimum of 192K bytes of RAM and two floppy-disk drives or one floppy- and a hard-disk drive; $998.
Natural Microsystems Corp., 6 Mercer Rd., Natick, MA 01760; (617) 655-0700; (800) 6-WATSON for demonstration

Phones have been getting more complex, adding auto-dial, automatic repeat for busy numbers, and features that answering machines have. At the same time, computers have been communicating via modems over the phone lines. Anticipating the growth of this trend, AT&T is now making its telephone transmission networks digital so one set of lines will carry both voice and data, and the giant communications company has also entered the personal computer field in a big way.

The new machines have the potential to revolutionize office communications. They resemble traditional squat black phones about as much as a Hasselblad resembles a box camera. Yet because they are new, they are often expensive and raise genuine questions of cost-effectiveness. Indeed, most of us have not yet become used to their conveniences and thus do not feel deprived without them. Like the earliest personal computers, they may be solutions looking for a problem.

More than simple telephones tacked onto or plugged into a computer, these devices can be confusing because of the wealth of communications features they offer. Essentially, though, the computer-phone fusion has led to two types of machines:

- add-ons that supply voice mail, telephone, and sometimes modem capacities to existing microcomputers
- personal computers and terminals, often part of an office network system, that are equipped with built-in communications capabilities.

The first type is most suitable for small businesses and professional offices already equipped with computers. The second type will meet the needs of a wider range of users: individual buyers may find personal telecommunications computers their most cost-effective choice, while businesses will want to consider the office systems with the most wide-ranging communications capacities of all.

Add-ons with Voice Mail

Of the various kinds of devices, voice-mail add-ons may have the hardest time finding a market. Also known as voice-store-and-forward systems, these add-ons digitize and enhance the functions of telephone answering machines. Basically, when somebody phones you, the computer answers. The caller leaves a message, say, a brief account of a conversation with a client, which the computer digitizes and stores on floppy or hard disk. When you check in with the computer, you hear the message played back via voice chip and speaker.

In general, voice mail offers benefits in an interoffice system where the alternative is a written message. The sender saves time, since the message is conveyed and stored in its original oral form, without having to be written or typed and physically delivered. The message arrives swiftly and, unlike most phone conversations, is repeatable. And because voice mail takes place on a computer, it can offer a variety of other services as well.

For instance, one basic system is the Voicemate, from Digital Pathways, which consists of a plug-in board and software and comes with a standard modular telephone cord to connect the phone and computer. "Everyone has a telephone, and we're trying to integrate the telephone into the IBM PC," says product manager Don Ringen, summing up the purpose of the system, scheduled to be released in June.

The Voicemate, like an ordinary answering machine, greets callers with a message and records their remarks. But it does more. It automatically removes periods of silence from the recorded messages, for faster playback. It keeps a phone directory and allows auto-dialing of listed numbers. The Voicemate also recognizes Touch-Tone codes, permitting remote access. Miles away from your office, you can call in and have your memos played back to you.

The Voicemate can also be set up as a message center for a number of workers in an office. With this kind of setup, callers append a Touch-Tone code to messages they leave. When you phone the office to retrieve your messages, you specify your code and get only the messages directed to you. When purchased with the Soundtools software, the system can also be programmed to interact with callers, who can then use Touch-Tone codes to input certain kinds of responses, such as gross receipts. With these capabilities, the Voicemate is an attractive alternative to answering machines or services for groups of coworkers in small businesses and professional offices, many of which cannot afford the more expensive voice-mail systems that large corporations install.

For individuals, however, the Voicemate is less appealing. It costs $499, as opposed to $100 or $150 for an answering machine. Moreover, the $499 price tag conceals the current bogey of voice-mail technology: a voracious need for storage capacity. The Voicemate demands 3.5K bytes of memory for every second of

Paul Freiberger is a West Coast editor of *Popular Computing* and coauthor of *Fire in the Valley: The Making of the Personal Computer* (Osborne/McGraw-Hill, 1984).

speech, or 210K bytes per minute. It therefore requires a hard disk if it is to accept many messages at all. A 10-megabyte hard disk will hold 45 minutes of speech, but when you add the cost of a hard disk—over $1000—to that of the Voicemate alone, the system becomes much harder to justify.

Voice Mail and More

More complex voice-mail devices, such as the Watson System from Natural Microsystems, have a modem capacity as well. "We're convinced that in the business world today there's a lot of frustration with telephone communication," says company president Charles Foskett. The Watson is designed to eliminate that frustration and speed up daily tasks by automating both telephone and data communications.

The $998 Watson is a full-length expansion card that plugs into the IBM PC and comes with telephone-management and communications software. Named for the man Alexander Graham Bell immortalized in the first telephone message, it does everything that answering machines and modems do and a number of other tasks besides.

Among its many capabilities, the Watson runs an appointment calendar with alarm clock. It records time spent on calls automatically, for billing purposes. It holds messages for particular callers, who can retrieve the messages by typing in the proper identification code. It forwards calls to another telephone if you know you'll be there for a certain period. It stores a list of phone numbers and dials them, with automatic repeats in case of busy signals. Moreover, if your computer has, say, 384K bytes of RAM, these functions can run simultaneously with an applications program such as Lotus's 1-2-3.

You can access all of Watson's functions directly through the keyboard or remotely by using the buttons on any Touch-Tone phone. For instance, if you're out of the office and want to get information you've stored in the Watson's phone directory, you call up Watson, enter your personal identification number, follow the system's verbal instructions, and key in the appropriate codes from the Touch-Tone keypad. To get the phone number of a client named Jones, for example, you'd type in 5-6-6-3-7 (the numbers on the telephone keypad that spell Jones), and the system would recite all the information you've recorded in Jones's file.

Finally, the Watson lets you insert additional comments into a message or cut and paste oral messages, much as you do written ones with a word processor. Its speech editor has many of the commands of a tape recorder, such as fast forward and rewind, plus commands for selecting, deleting, moving, or copying segments of speech. An on-screen window displays lines that indicate the length of words, which shows you where you are within the oral document.

The speech editor enables you to put together thoughtful voice memos, rather than restricting you to recording top-of-the-head comments that distinguish answering machines. For instance, you can dictate, review, and polish a letter or memo before forwarding it to a colleague or sending it to a secretary for typing. Thus the speech editor gives voice mail the powers of a tape recorder and an answering machine and elevates it above both.

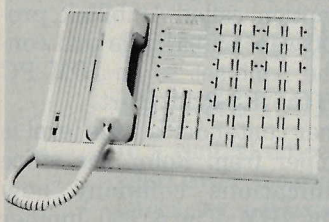
Nonetheless, like other devices that offer voice mail, the Watson faces the problem of storage. Two minutes of dictation can occupy as much as 360K bytes. The Watson offers two strategies to circumvent this nuisance: it lets you limit the time per message, and it permits high-density storage of voice. The first option, however, reduces the utility of the machine, and the second weakens voice quality so that messages abound in clicks and bursts of noise.

Because the Watson provides phone and data communications capabilities in addition to voice mail, managers and executives may find that its time-saving conveniences more than offset its price and need for storage. Still, the future of voice-mail machines depends on lowering

ADD-ONS WITH PHONES AND MODEMS

AMBISET

Stand-alone unit with intelligent telephone; 8-line by 80-column LCD screen or 9-inch monitor; 8088 microprocessor; 128K bytes of RAM; built-in 300-baud modem; $1195. Options: internal 1200-baud modem; $395; 2400-baud modem, $795; Ambimail electronic-mail software, $300; Ambilink software and cable, $95.
Ambi Corp., 1033 Washington Blvd., Stamford, CT 06901; (203) 323-9811 or (800) AMBISET



COSYSTEM

Stand-alone intelligent telephone with Z80 microprocessor; 92K bytes of RAM; telephone-management and communications software; built-in 300- or 1200-baud modem; for IBM PC, XT, AT, and compatibles; requires a minimum of 192K bytes of RAM (256K bytes recommended) and two floppy-disk drives or one floppy- and a hard-disk drive; $1495 with 300-baud modem; $1845 with 1200-baud modem.
Cygnet Communications, 1296 Lawrence Station Rd., Sunnyvale, CA 94089; (408) 734-9946

JUNIPER

Expansion card with 8K bytes of RAM; communications software; stand-alone intelligent telephone with built-in speakerphone and 1 to 4 phone lines; for IBM PC, XT, and compatibles connected to Rolm's CBX (digital private branch exchange); requires a minimum of 256K bytes of RAM (384K bytes recommended); $1500.
Rolm Corp., 4900 Old Ironsides Dr., Santa Clara, CA 95054; (408) 986-1000

TELECOMPAQ

IBM PC compatible with 8086 and Z80 microprocessors; 384K bytes of RAM (expandable to 640K bytes); three 5¼-inch floppy-disk drives (hard-disk drive optional); 9-inch monochrome monitor; detachable keyboard; two or five phone lines; built-in Hayes 300/1200-baud modem; telephone handset with speakerphone; telephone-management, communications, and desktop-management software; basic model, $4195.
Compaq Telecommunications Corp., 15182 Marsh Lane, Dallas, TX 75244; (214) 484-4200

the cost of storage. It might be accomplished through cheaper mass-memory devices or through better voice-compression techniques so more words can be stored per byte. Although advances in compression are occurring apace, the former route is predominating. Hard disks are dropping in price faster than speech compression is improving in quality. Unfortunately, even if the cost of hard disks fell to $200, answering machines would still be cheaper than voice mail.

Phone and Modem Add-ons

Other kinds of add-ons either omit voice mail or offer it only as an option and hence avoid the requirement of burgeoning storage. These devices rely mainly on a modem for electronic mail and also have a very well developed telephone. By combining voice- and data-communications capabilities in a single device, these add-ons attempt to simplify and speed up both types of transmission. Some of the devices can also handle voice and data communications simultaneously. (Both these add-ons and telecommunications computers have recently begun to be called "integrated voice/data workstations" or IVDWs, a clumsy term that may well be bound for the jargon boneyard.)

There are many devices in this category. One is the Cosystem, from Cygnet Communications, a company founded and run by an inventor of the microprocessor, Federico Faggin. The Cosystem is a small console with buttons and a telephone handset. It works with IBM PCs and compatibles and contains a modem, a Z80-based microcomputer, and 92K bytes of memory for storing phone numbers and performing other functions.

The Cosystem possesses a number of very likable features. It can communicate with ordinary modems, of course, but its capacities are enhanced when dealing with other Cosystems. You can send messages with three keystrokes or fewer and do so while your computer remains in full operation on some other task, a feature called concurrency. This capability eliminates the annoying dead time during which the computer must tend to the modem. For example, you can work on a spreadsheet, call a colleague, transmit the spreadsheet, and then discuss possible changes while you're both looking at it, without the need to exit from the program or redial the phone.

The Cosystem can be programmed to transmit to other Cosystems during the night when rates are lower, even if the computers themselves are turned off. It flashes a red light when a message has arrived, so you don't have to check the device constantly to see if you've received new data. It can send one message to many different recipients simultaneously, much as one might circulate a memo to numerous coworkers in an office.

Also included in the Cosystem is a very intelligent telephone, with features such as auto-dial, three-way teleconferencing, and a directory search function (for sorting through and accessing phone numbers by selected criteria). The system's clock/calendar can be used for scheduling appointments and can keep records of all your incoming and outgoing communications.

However, the price of the Cosystem is $1495 for the 300-baud version and $1845 for a 300/1200-baud version, and once again the potential buyer faces a decision on cost-effectiveness. For individuals and office workers who send a limited amount of data, a standard modem and telephone is probably the wiser choice. The Cosystem is more attractive for those who need to frequently discuss information and exchange data, particularly groups of workers within offices and large companies. In these situations, the cost of several Cosystems may be justified by the increased efficiency with which you can move from task to task.

A similar device is the Ambiset, made by Ambi Corporation. Priced at $1195, the basic model has an 8088 microprocessor, 128K bytes of RAM, a 300-baud modem, telephone handset, and full-sized keyboard. Its 8-line by 80-column liquid crystal display gives it a low profile, so that it looks more like a typewriter than a computer, though the company offers a standard monitor with a 9-inch screen as an alternative. The Ambiset also features a speakerphone, call forwarding, a text processor, and a programmable calculator.

With its communications program called Ambimail, this device can send and receive text with one keystroke, perform unattended operations, automatically forward phone calls, transmit messages while you're working on the computer or speaking on the phone, and send memos to numerous people at once. With this software, the Ambiset can communicate with other Ambisets and with IBM PCs and compatibles equipped with a Hayes modem. A second option, called Ambilink, provides software and a cable that connects the Ambiset to an IBM PC through the RS-232C port.

Another contender at this level is the Juniper from Rolm, the office communications company now owned by IBM. The $1500 Juniper looks somewhat like the Cosystem and links IBM PCs and compatibles to a CBX, Rolm's digital private branch exchange.

Although the Juniper allows for a voice-mail option, called Rolm Phonemail, the basic unit is a modem and an intelligent telephone. It has 8K bytes of memory to store phone numbers, log-on sequences, and other information. It offers such

—Continued on page 128

WHATEVER HAPPENED TO

The Electronic Cottage?

WHY THE TREND TOWARD TELECOMMUTING IS JUST A RIPPLE, NOT A WAVE

BY DOUG STEWART

TWO YEARS AGO, *Forbes* ran a cover story with the headline "It's 8:45—Do You Know Where Your Employees Are?" The story described the trend toward telecommuting—working at home using a computer and sending work to a central office by phone line. The magazine's cover showed a deserted freeway leading into a city, a relaxed beagle strolling across the pavement.

Anyone who's visited a city lately knows that a beagle wouldn't last long on a freeway at 8:45 a.m. Rush hours are as chaotic as ever. So if telecommuting is such a great idea, why hasn't it caught on?

The answer has to do with both individual and corporate personalities. Not all of us are cut out to be telecommuters, nor are all corporate cultures ready to deal with a remote work force. A change from working in an office to working at home is much more a social change than a technological one, and social change never comes easy. For a number of reasons, people can't shift from office work to home work as casually as they discarded slide rules for pocket calculators.

At first glance, it's hard to see why the advantages of telecommuting haven't lured hordes of workers away from offices and into homes. From an individual's point of view, one benefit of telecommuting is immediately obvious: you don't have to get up at 7 every morning and drive somewhere. By working at home, a telecommuter eliminates the $1000 expense that the average worker racks up each year getting to work and back. Aside from the

cost, commuting is a stressful way to kill two hours every day.

Other benefits of telecommuting are less easily measured but no less appealing. "I can stop and enjoy the day when I want to," says one telecommuter describing her situation. Says another, "If I want to work on a Sunday morning (and I usually do), I can and it's no big deal." And for a number of working parents with young children, telecommuting is a way to juggle jobs and family.

Both workers and employers agree that telecommuting boosts productivity, often substantially. Many telecommuters admit to working longer hours without prodding, and they get more work done per hour without the noise and interruptions of an office. Chris Rutkowski, founder of Rising Star, a software development firm in Torrance, California, describes the productivity of his firm's telecommuting programmers as "outrageous."

Aside from boosting output, telecommuting is a way for individuals and employers to set up work arrangements that would normally be out of reach. Experienced female workers who take maternity leaves make up the majority in many telecommuting programs. And at some companies, employees who have become disabled through illness or injury are part of an off-site work program.

The Hidden Costs

For telecommuters, however, working at home is not an unalloyed joy. Full-time home workers often feel isolated from the professional and social interaction of an office. Having children or family at home does not necessarily make up for the isolation; friction often builds up between spouses when both are at home and one of them is trying to work professionally.

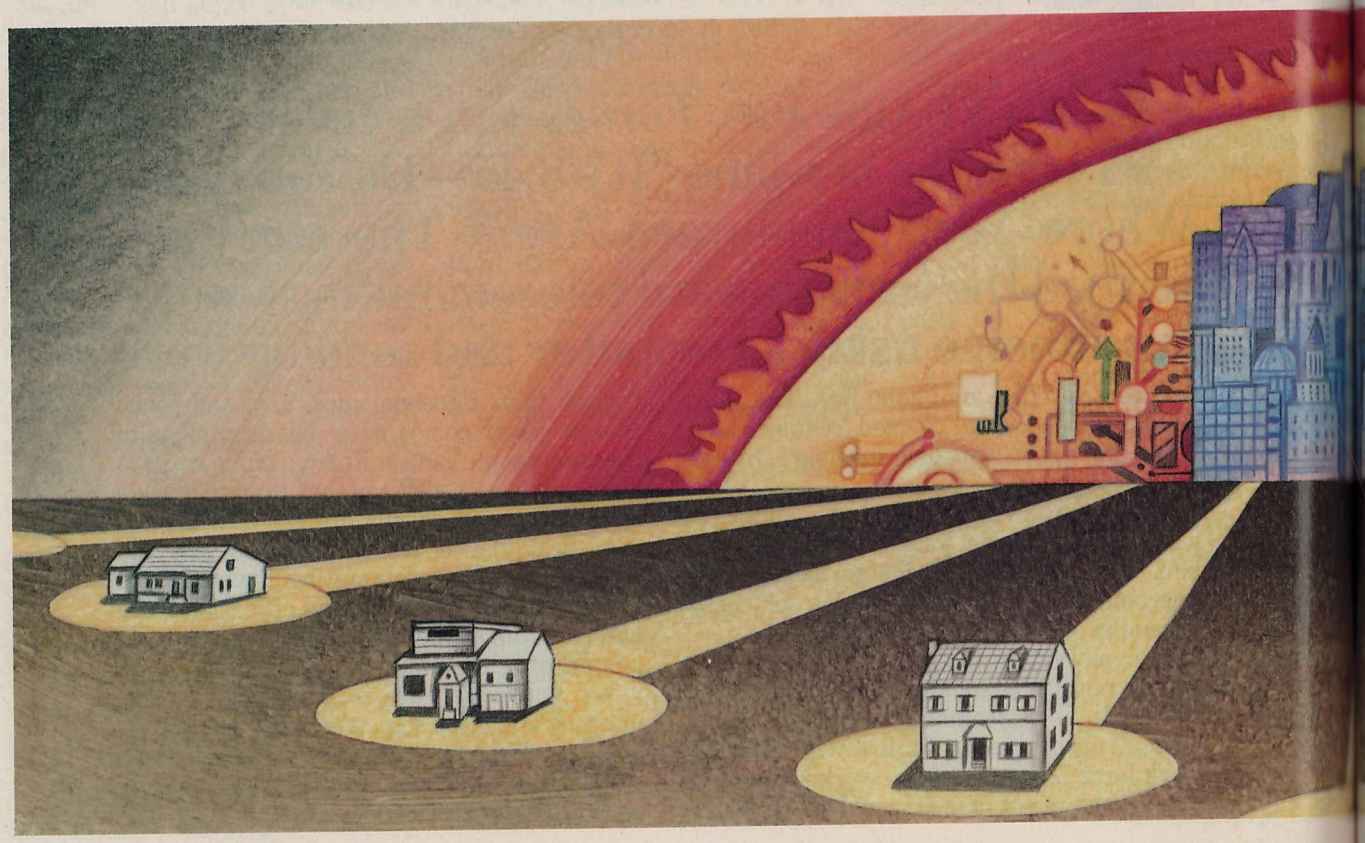
Workers who begin telecommuting hoping to avoid the necessity of day care often change their minds. "This started out as a six-month maternity leave," says Marilyn Bigalke, a staff consultant for Control Data who works at home full-time, 100 miles from the firm's Minneapolis office. "My son was here until he was eight months old, then it got too impossible." She now hires a full-time babysitter.

Even if one's home is as tranquil as a church, a telecommuter may find that other problems crop up. There are outside interruptions at home just as there are at the office. "Salespeople ring the doorbell and think that since you're home you must be a housewife," says Dawn Johnson, who serves as librarian for the Source's Participate conferencing system from her home in Wisconsin. "One person wanted me to spend an hour rating orange juice packets," she says.

Some problems are unforeseen. "One woman couldn't stay away from the refrigerator," recalls Nelson Phelps, a training manager for Mountain Bell Telephone in Denver and the organizer of a telecommuting pilot program. "She gained 20 pounds over a month and a half."

Motivation is probably the toughest problem of all. "Sometimes I feel like I'm in a house, not an office, and I can't get going," says Jean Brown, a staff writer for Burnham-Callaghan Associates, a New York City public relations firm. Brown works at a word processor in her one-bedroom apartment a few blocks from the office. "At first, getting up from my desk at the end of the day and going two feet to the easy chair was psychologically distressing," she says. "Now the color TV and the easy chair are in my bedroom. I

Doug Stewart is a freelance writer who lives in Ipswich, Massachusetts. His article "Micros in Research" appeared in the April 1985 issue of *Popular Computing*.



found I had to make that distinction."

Brown's problem is not unique. Dr. Charles McClintock of Cornell University's College of Human Ecology carried out a survey of 140 telecommuters with a broad range of jobs. "Some people need external cues to keep them on task," he says. "At home, the external cues aren't there." To combat this problem, many home workers say they need to stick to fixed business hours. Some dress up in business clothes. McClintock encountered one telecommuter who played tape recordings of office sounds while he worked.

The Ideal Telecommuter

Chris Rutkowski of Rising Star has more experience than most in watching telecommuters succeed or fail. He claims he has figured out the ideal profile of a telecommuter. First, a remote worker should be the proverbial "self-starter" that want ads are always looking for. "Otherwise," he says, "you put them in the home and they immediately go criminal. They take it as a permanent vacation." Second, the person should have a job that doesn't require constant interaction with colleagues. And third, the telecommuter must live in a home that's pleasant to spend time in. "For some people, working at home is a perk," Rutkowski says. "For others, it's not."

Many of the workers who adjust most successfully to telecommuting are highly skilled employees, often programmers, systems analysts, or engineers, who are accustomed to working alone at all hours. They often readily confess to being compulsive about their work. George Reinhardt is fairly typical. From his home in Allentown, Pennsylvania, Reinhardt oversees software design for a Massachusetts computer-conferencing firm. "At any given time between 9:00 a.m. and midnight or 1:00 a.m., I could be working," he says. "I guess I'm a workaholic."

A second category of worker may not fit Rutkowski's profile but tends to jump at the chance to telecommute. This is the person—typically a clerical worker—who needs to stay home for one reason or another, perhaps to take care of children, perhaps because there is no money for a car, perhaps because of a disability. "Add to that a lack of skills that are in demand," says Margrethe Olson, a professor at NYU's Graduate School of Business Administration, "and when the company says, 'We'll let you work at home,' they say, 'I'd love to.' But it's only as an alternative to not working at all."

Not surprisingly, these two kinds of employees usually strike two very different working arrangements with their bosses. The highly skilled professional usually draws a salary and works on a project basis, agreeing to bring in a report or a program in a few days or a few weeks. These people typically have their own microcomputers, and telecommuting simply means using the computer at home.

The other type of telecommuter—the home-working clerical—tends to work on a series of routine tasks that are performed on-line, where progress can be easily monitored by a manager. Some of these workers remain full-fledged employees with benefits, but working arrangements run the gamut. Some workers are paid by the piece, others by the hour. Some have leased terminals, some buy their own, and others have terminals installed by the company free of charge.

When the company has a union and the home worker's wage is below scale, sparks can fly. The Wisconsin Physicians Service in Madison has been paying its part-time home workers $3.75 an hour with no

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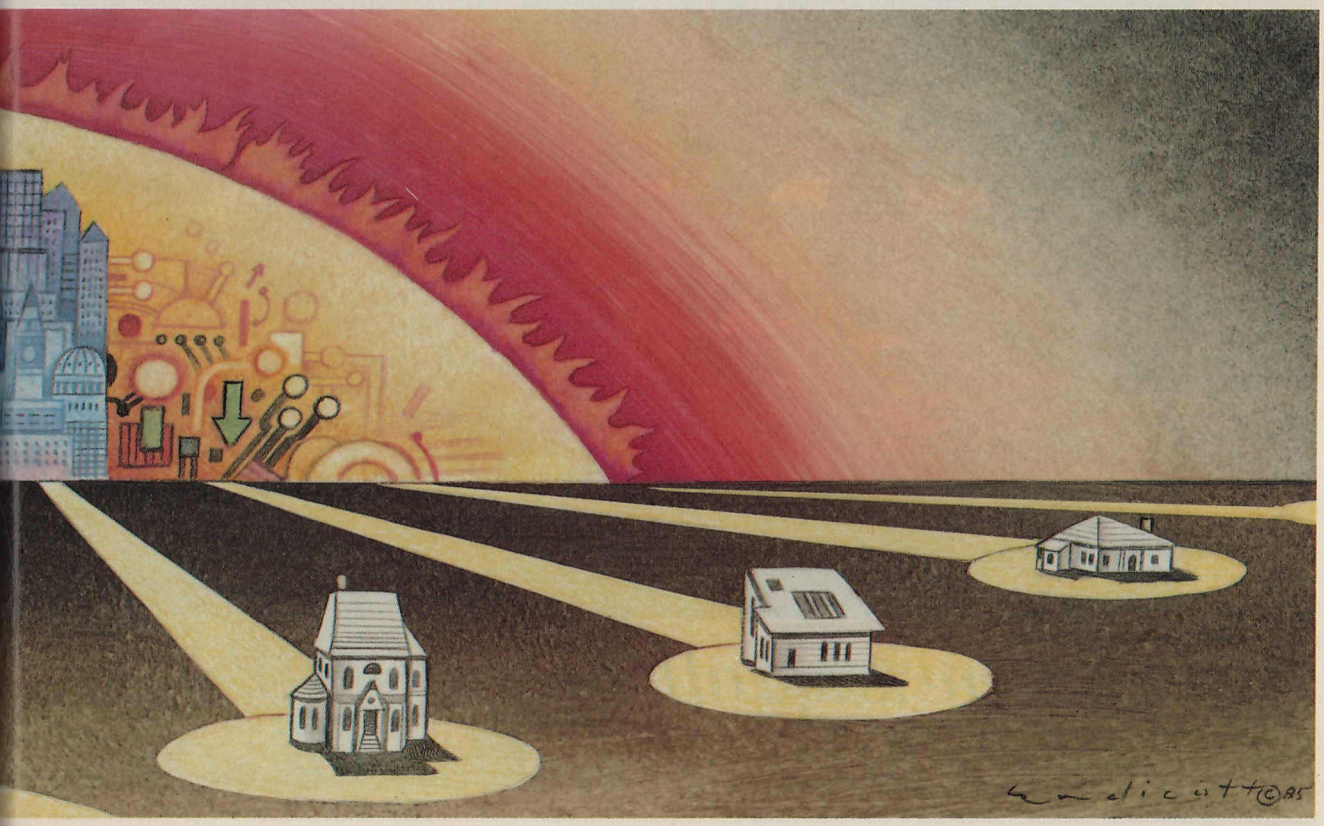


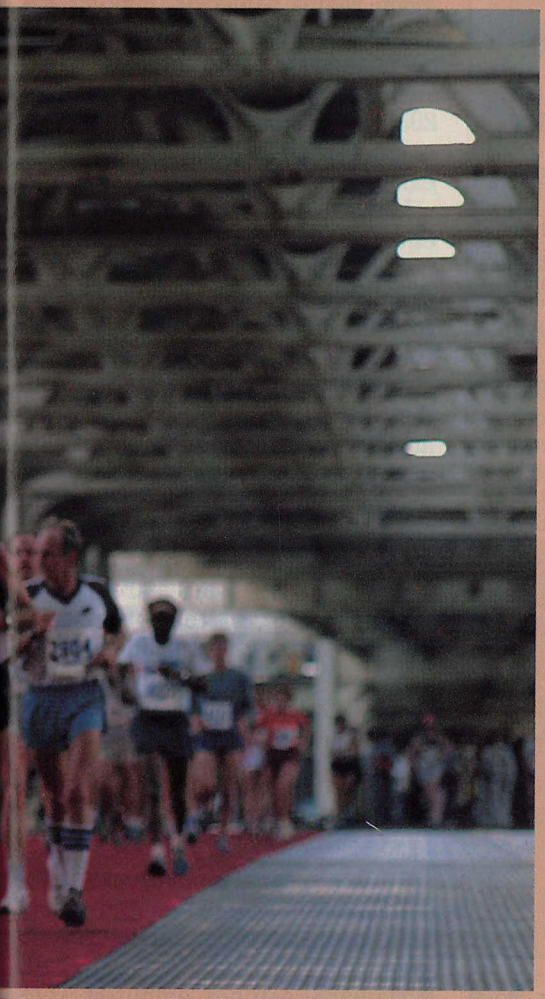
Illustration by James Endicott

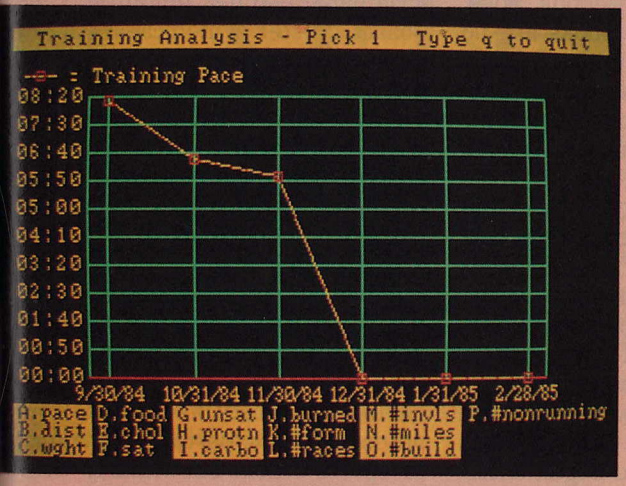
Use your computer to

KEEP IN S

Yes, there is life after work, and this software helps you make the most of it

HAPE





BY JOEL C. DON

A LOOK AT PAPERBACK BEST-SELLER lists reveals where the concerns of Americans lie these days. Trailing close behind books instructing you how to win in real estate and how to win the sales or managerial game are the titles that tell you how to achieve glowing health.

Indeed, anybody who hasn't tried to shed a few pounds or build a healthy heart is almost an exception today. Runners pound the asphalt well before the sun rises, and TV aerobics programs inspire legions of would-be Jane Fondas.

It didn't take long for software makers to capitalize on the health and fitness boom of the '80s. Dozens of software packages now offer help for those on the road to thinner figures or greater physical endurance.

Like the fitness boom, the number of programs designed to help you trim down and shape up continues to grow at a steady pace. Future Computing, a market-research firm, pegged the market for so-called life-enrichment or self-help software at $33 million in 1984, a figure that's expected to soar to $57 million this year. Exercise and nutrition software makes up a large portion of life-enrichment software, which also includes programs offering hobby information, behavioral analysis, and the like.

Self-help software is succeeding because it complements how-to books. In particular, diet and exercise packages add new elements of feedback and interaction. Some programs feature graphs and charts to illustrate your progress. Some programs act like a tutor, providing expert advice that you can tap as you progress in your health and fitness regimen.

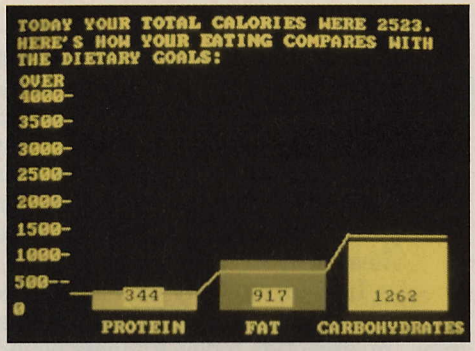
There are essentially three types of health and fitness software:

- Nutritional-analysis programs, designed to break your meals into their components for menu planning and dieting
- Exercise programs that can track your aerobics, running, or other activities
- Combined exercise and nutrition programs that take a two-pronged approach to health

Diet and exercise software ranges in price from $19 to $350, though you'll find many satisfactory programs for less than $80. If you're interested only in checking your level of dietary sodium or reducing fat intake, you can select from a wide variety of nutritional-analysis programs, such as Eating Machine, Nutri-Byte, or Dietitian. If you want to keep track of your jogging schedule or aerobics workouts, you'll find what you need with exercise-only programs like Be Your Own Coach, Run-

Programs like the James F. Fixx Running Program (left) track diet and exercise.

PHOTOGRAPH BY ROBERT MCQUILKIN



Nutrition programs track calories, fats, and other food components.

NUTRITION

Dietitian for Apple II series, $59.95. Dietware, POB 503, Spring, TX 77373; (713) 440-6943

Dietmac for Apple Macintosh, $79. Dietware, POB 503, Spring, TX 77373; (713) 440-6943

Diet Wise for Apple II series, IBM PC, XT, PCjr, CP/M-80 systems; $120. Nutritional Data Resources, POB 540, Willoughby, OH 44094; (216) 951-6593

Eating Machine for Apple II series, $49.95. Muse Software, 347 North Charles St., Baltimore, MD 21201; (301) 659-7212

Evrydiet for IBM PC, XT, PCjr, and compatibles; $62.95. Evryware, 1950 Cooley Ave. #6208, Palo Alto, CA 94303; (415) 321-2708

Heartware for Apple II series, TRS-80 Models III, 4, IBM PC; $50. Soft Bite Inc., POB 1484, East Lansing, MI 48823; (517) 337-1253

Model Diet for Apple IIe, IIc, $49.95; Commodore 64, $34.95. Softsync Inc., 162 Madison Ave., New York, NY 10016; (212) 685-2080

NSL Diet Analyzer Program for IBM PC, XT, PCjr, and compatibles; $49.95. Natural Software Limited, Suite 7E, 7 Lake St. White Plains, NY 10603; (914) 761-9329

Nutri-Byte for IBM PC, XT, and Apple II series; $79.95. ISC Consultants Inc., Suite 602, 14 East Fourth St., New York, NY 10012; (800) 882-3438

Nutri-Pack for Apple II series; $39.95. Microcomp Inc., 2015 NW Circle Blvd., Corvallis, OR 97330; (503) 754-0811

Nutripak Professional for IBM PC, XT, PCjr, CP/M-80 systems; $349. Nutritional Data Resources, POB 540, Willoughby, OH 44094; (216) 951-6593

Nutriplan for Apple II series, IBM PC, XT, PCjr, Zenith 150; $75. Micromedx, 187 Gardiners Ave., Levittown, NY 11756; (516) 735-8979

Nutritionist I for Apple II series, IBM PC, XT, PCjr, TI Professional; $145. N-Squared Computing, 5318 Forest Ridge Rd., Silverton, OR 97381; (503) 873-5906

ning Coach, or Aerobics Master. And if you believe that a good diet must be linked to an exercise routine, you'll find a more integrated approach in combined exercise and nutritional programs such as the Original Boston Computer Diet and the James F. Fixx Running Program (see the reviews on page 96).

Computers Don't Lie

Most people who only want to check calories occasionally or shed a pound or two can do quite well without a computer. But for people seriously interested in achieving long-term goals, notebook logs, calorie counters, and books are no match for the speed and efficiency of a micro. Computers excel at keeping tabs on the number of calories you take in, the number you expend, and sometimes both.

Computerized record keeping does more than streamline the task of counting calories. The computer's dispassionate recording of your daily diet and exercise patterns offers an honest appraisal of your progress and can also reveal surprises.

One dieter I spoke with purchased a nutritional-analysis package when she started a diet and began entering information about her daily meals, snacks and all. The experience was sobering. The program, called Nutri-Calc, showed that her diet was lacking in several nutrients, including calcium, which ranks among the top health concerns for middle-aged and elderly women.

"I had been on diets before, but so often when you go on a diet you cut down on calories and you really don't know whether you're getting all your nutrients," she says. "The program really helped in making me more aware of what I was eating." She now wishes she could have had such a thorough nutritional analysis 20 years ago so that she could have corrected her diet deficiencies earlier.

Many dieters face a different but equally insidious problem. "I find people who say they follow a diet usually lie to themselves and don't count calories at all," says Dr. Bob Kortzeborn, a nutritional chemist in Palo Alto, California, who analyzes diets and sets up special menus for athletes and bodybuilders. "If you understand thermodynamics and energy conversion, you realize that the important thing is the number of calories you take in your body. And how those calories are distributed in fats is very telling for someone who has a weight problem." The computer's strength, Kortzeborn agrees, is that it tells you exactly what you've done rather than what you think you've done.

Increasingly, diet and exercise programs are written by doctors, dietitians, nutritionists, and marathon runners. For example, one of the latest entries in exercise and nutrition software, the Original Boston Computer Diet, boasts a roster of medical and nutritional specialists who worked on the software, coupled with a so-called "expert" system that carries on a dialogue with the user. In effect, you choose among three knowledgeable computer "personalities" to help you reach your diet goals.

But even though an increasing number of diet and exercise programs are designed with the aid of health experts, most medical authorities say that self-help software should not substitute for a doctor's advice or the expertise of a trainer or sports coach. Particularly when people undertake strict diets or

Joel C. Don is a California-based writer specializing in science and health.

rigorous training schedules, programs should supplement lab tests or consultation with a physician.

Need for Feedback

Yet even under circumstances that require professional help, there are advantages to personal monitoring coupled with physician consultation. For instance, William E. Hogg Jr., an internist in Georgetown, Texas, says that many of his patients keep diaries of their blood sugar levels, food intake, and other measurements. When a patient brings a log of foods to Hogg, his staff computes the calories and other nutrition information.

With this procedure, Hogg says, the patient misses out on the daily feedback that can be achieved with a computer program. "If patients can see how they're doing, they won't have to wait for the doctor visits every two weeks to check their progress," he says. "They'll have defined goals and know whether they've attained them."

Most nutrition-only programs are basically specialized databases with hundreds of food and nutrient breakdowns. With these programs (see "Nutrition" on page 70), you can compare the results of your diet analysis against nutrition standards set by the federal government. You can also use the information to create special low-sodium diets, plan meals for diabetics, or keep tabs on high-fat or high-sugar foods for a weight-loss program.

Some programs chart your daily progress with graphs and tables.

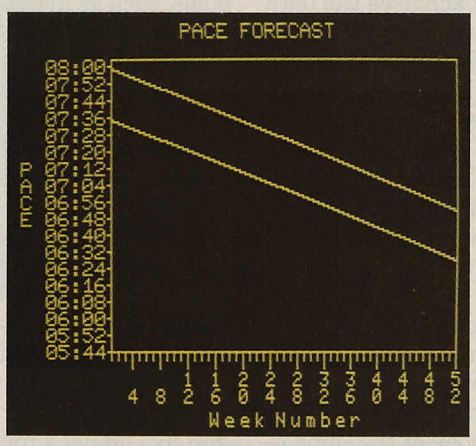
The analysis a program provides is only as good as its database of information on food constituents and the sources it uses as the basis for nutrient breakdown. Most nutrition programs go the conservative route. Instead of relying on the recommendations of megavitamin gurus and others touting unusual dietary practices, the majority of programs adhere to the U.S. Department of Agriculture's charts on fats, protein, carbohydrates, and calories, as well as the Recommended Dietary Allowances (RDA) for vitamins and minerals established by the Food and Nutrition Board of the National Academy of Sciences.

For those who believe the government is too stingy with its vitamin and mineral requirements, several programs let you modify the RDAs. Evrydiet, for example, lets you plug in a 3000-milligram daily dose of vitamin C (the RDA is 60 mg).

Dr. Zoe Ann Holmes, a foods and nutrition scientist at Oregon State University, warns of the dangers of relying solely on the nutritional breakdown of foods. Your body's metabolism, or ability to digest and use nutrients, Holmes says, might not coincide with government norms and might require nutritional supplements.

"The problem starts when someone takes a nutrient value as the gospel," Holmes explains. "Nutrient analysis still isn't an exact science. Many stresses affect nutrition, so it can be dangerous if someone relies on the data alone. If you have diet problems, you should see a professional—knowing your nutrient analysis is just the first step."

BE YOUR OWN COACH



Exercise programs help you develop customized workout schedules.

EXERCISE

Aerobics for Atari 400/800, Commodore 64; $34.95. Spinnaker Software, One Kendall Square, Cambridge, MA 02139; (617) 494-1200

Aerobics Master for Apple II series; $25.95. Free Lance Ink, 1806 Wickham, Royal Oak, MI 48073; (313) 280-2634

Be Your Own Coach for Apple II series, IBM PC, XT, PCjr, $49.95; Commodore 64, $39.95. Avant-Garde Publishing Corp., 37B Commercial Blvd., Novato, CA 94947; (415) 883-8083

Running Coach for Apple II series, IBM PC, XT, PCjr; $69.95. Software Publishing Corp., POB 306, 125 Main St., Half Moon Bay, CA 94019; (800) 851-2917, (800) 223-1479 in CA

Running Your Best Race for Apple II series, Commodore 64, IBM PC, PCjr; $18.95. Wm. C. Brown Publishers, POB 539, 2460 Kerper Blvd., Dubuque, IA 52001; (319) 588-1451

Nutrition programs vary widely in sophistication and price. Naturally, if all you want to track is calorie content, fats, carbohydrates, proteins, and a few other nutrients, you won't need a program that accounts for every component, including trace minerals and essential amino acids.

For a simple diet-analysis program, you might consider less expensive programs such as Eating Machine, Evrydiet, or Nutri-Pack. With these packages, you get a database of several hundred foods and provision to add more. You can also create and analyze daily menus to determine excesses as well as deficiencies in vitamins, minerals, protein, or fats.

If you're looking for a real bargain in health software, Softsync's Model Diet, at $49.95 for the Apple version, offers 2000 foods on file and on-screen information about vitamins, minerals, and your ideal weight.

Among the more recent and sophisticated diet programs is Nutri-Byte, from ISC Consultants. This $79.95 package guides you through a five-week program designed to help you reach and maintain your proper weight. Nutri-Byte stores the compositions of more than 1200 foods and compares your daily intake with the RDAs. It collects information on factors that affect your eating habits, such as hunger level, physical activity, and moods like boredom and stress. It also tracks where and with whom you eat. When it detects a continuing pattern, the program displays a message such as, "I see you have cut down on eating while watching TV. That's very good"—a type of reinforcement some dieters will welcome.

One of the early entries in the personal diet market was Nutritionist I, developed by N-Squared Computing. For the higher price of $145, Nutritionist I will tell if you're consuming too much sodium or cholesterol and how much vitamin C comes from the foods you eat. The program also has the ability to create meals designed specially for diabetics, pregnant or lactating women, and, of course, dieters. Nutritionist I accounts for 19 nutrients in foods and has a database of some 730 foods.

Tracking Your Training

If running is your game, along with 30 or so million other Americans, there are several programs designed to meet your needs (see "Exercise" on page 71). Most avid runners keep good records. But these programs can develop customized workout schedules and take the drudgery out of month-by-month analysis of performance.

If you need only a method of charting your running progress and don't want to concern yourself with nutritional analysis, Running Coach, Running Your Best Race, or Be Your Own Coach will suffice. These programs graphically plot your weekly, monthly, and year-to-date progress and also record personal notes on course conditions, weather, state of health, and other information.

Robert Lee Smith of Portland, Oregon, developed Be Your Own Coach after years of participating in marathons and helping others develop Olympic-style training schedules to reach their own competition goals. "The point of any computer running program is to help you reach your goal or to help you set goals," Smith says. "When people start keeping records they improve.

Be Your Own Coach uses the data you enter to produce workout schedules, making adjustments to the schedules as you improve. The program also graphs 17 variables, including mileage, pace, and heart rate. Running Coach, a similar package from Software Publishing Corp., sets up individualized schedules based on your age, sex, fitness level, and how many days a week you want to run.

A third program designed to simplify record keeping, training, and analysis is Running Your Best Race. Packaged with a book of the same title by veteran runner Joe Henderson, this program provides advice on pace and tactics based on the data you type in.

If you loathe the idea of running, you'll find a few economically priced programs such as Aerobics or Aerobics Master. Spinnaker Software's Aerobics has an unusual twist: this program displays a high-resolution, human-like figure to follow à la the Jane Fonda videotape, with musical background and 14 different exercise routines.

Serious health devotees will want to examine software that contains both exercise and diet components. Usually, the software in this category gives greater weight to diet and nutrition than it does to exercise.

The exception to this rule is the James F. Fixx Running Program, which focuses more on the fitness end of the scale. This program will assess your current state of fitness and then help you set distance goals, predict performance in short races and marathons, and offer advice on pacing, clothing, and exercise. At $79.95 it offers a nutritional module as well.

The Well-Rounded Approach

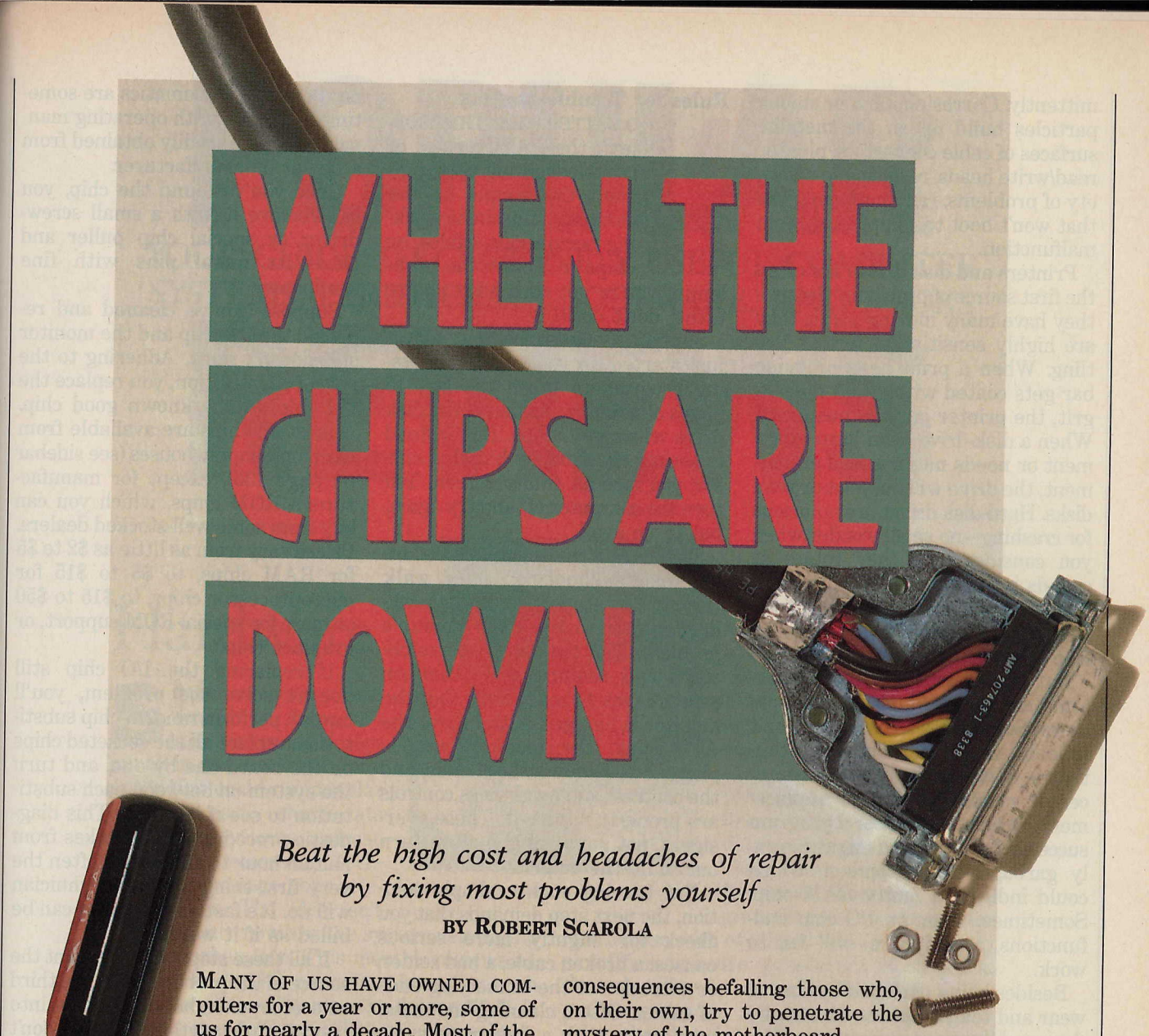
More typical of combined diet-and-exercise programs are packages such as Health-Aide, Master Control Diet and Exercise Program, Nutritionist II, and Nutri-Calc (see page 137). These programs offer substantial food databases, graphic displays of the nutrient makeup of your meals, and monthly or yearly progress reports on your calorie intake, weight, and many other nutritional factors. The exercise segment of these programs lets you record your running schedules and set specific goals, such as increased distance per run or reduced resting pulse rate. You can also monitor other activities, such as swimming, bicycling, tennis, and so on. Some of these programs feature graphs or bar charts to illustrate your month-to-month progress.

Health-Aide, a comprehensive diet and exercise program, is representative of many of these packages. Health-Aide can break foods down into 35 nutrients, including amino acids. Its database includes some 700 foods, and you can add as many as you like. What's more, the program lets you construct foods from various ingredients and store them on disk. Thus Health-Aide will give you a reliable nutritional evaluation of your favorite peanut-butter-and-jelly sandwich, even if it's made with whole wheat bread, sprouts, and bananas. Another feature is a list of 150 activities and charts that'll help you figure the amount of time you'd need to perform an activity to burn off a specific number of calories.

Los Angeles Dodger trainer Bill Buhler recommends that athletes pay close attention to nutrition as well as exercise. With the aid of Nutri-Calc, Buhler watches the

—Continued on page 137

WHEN THE CHIPS ARE DOWN



Beat the high cost and headaches of repair by fixing most problems yourself

BY ROBERT SCAROLA

MANY OF US HAVE OWNED COMputers for a year or more, some of us for nearly a decade. Most of the time, we rhapsodize about them and the capabilities they lend us. But as our equipment grows older, the frequency of problems and need for maintenance and repair also grow.

Metals corrode, cables wear or break, keys stick, soldered connections loosen, chips blow, and downtime becomes inevitable. The standard 90-day warranty expires all too soon, and low-cost, reliable, and fast repair services are still hard to find. Most repair shops charge from $45 to $75 per hour, with an hour minimum, just to diagnose a problem. By the time the shop adds parts and labor, the average service charge runs about $100, with a three-day to three-week turnaround. Nonetheless, manufacturers, dealers, and manuals continue to warn of dire consequences befalling those who, on their own, try to penetrate the mystery of the motherboard.

With a few simple tools and some basic information, however, computer owners can avoid most of the expense and, even more important, the downtime involved in sending a computer out for repair. In fact, according to some estimates, people with no technical expertise at all can learn to fix 75 percent of their computer problems. Even changing a blown socketed chip is easier than changing a bad spark plug once you're shown how.

What Can Go Wrong?

Regardless of make, model, or price, all computers are susceptible to certain types of problems. Often a broken wire or loose solder joint causes the monitor to continually flicker or a peripheral to work inter-

PHOTOGRAPH BY ED CRABTREE

mittently. Corrosion, dirt, or smoke particles build up on the metallic surfaces of cable connectors, pins, or read/write heads, resulting in a variety of problems, ranging from disks that won't boot to complete system malfunction.

Printers and disk drives are often the first source of problems. Because they have many moving parts, they are highly sensitive to dirt or jostling. When a print head or guide bar gets coated with paper dust or grit, the printer jams or misprints. When a disk-drive head loses alignment or needs motor speed adjustment, the drive will not boot or read disks. Hard-disk drives are notorious for crashing—no small wonder when you consider that they rotate at speeds in excess of 3600 rpm, with a read/write head that floats a fraction of a millimeter above the surface of the disk.

But other parts of computer systems are not exempt from breakdown. Sometimes a computer won't function at all, perhaps indicating that a ROM chip or the microprocessor needs cleaning or replacement. Other times, after a program successfully boots, you might see only garbage on the screen, which could indicate a faulty RAM chip. Sometimes, when an I/O chip malfunctions, a peripheral will fail to work.

Besides being damaged by normal wear and tear, chips are also easily damaged by power surges caused by lightning strikes, power company error, or startup of motors on the same circuit as your computer. Similarly, static electricity that you transmit when you touch an open port or even type at the keyboard can easily damage chips as well; your body can carry as much as 30,000 volts of static electricity.

In addition, different models tend to suffer from different types of problems. With Apple II and IIe computers, for example, if peripheral slots are filled with boards and no exterior fan is attached, excess heat can often cause chip failure.

As infuriating as these problems can be, most of them require little or no technical expertise to repair. Apart from aligning and timing disk drives, you can troubleshoot and fix many malfunctions yourself.

Robert Scarola is a computer consultant and writer living in San Anselmo, California.

Rules for Troubleshooting

NO MATTER WHAT THE PROBlem, these three rules of troubleshooting apply: go from the simple to the complex; substitute working peripherals, cables, or chips to isolate the problem; if you're not sure what you're doing, don't do it!

Suppose, for instance, that you've just started up your word-processing program to finish the last 10 pages of a report. As usual, the disk drive whirs and stops. But instead of seeing the familiar blinking cursor, you face an empty screen. You turn the computer off and try again, but to no avail.

To illustrate the general procedure for troubleshooting, let's walk through the steps involved in tracking down the source of the monitor's problem. The first step seems obvious and requires only common sense: check to make sure that the monitor is plugged in tightly at the AC outlet, the monitor jack is plugged in firmly at both ends, and the contrast and brightness controls are properly adjusted. These oversights, not surprisingly, often turn out to be the culprits.

But barring such a simple solution, the next step demands that you check for slightly more serious causes: a broken cable, a bad solder, or corrosion at the connecting ends of cables. Often, cleaning the metal connectors with a fine-grade sandpaper will clear up the problem at this stage in the process.

If the screen still remains blank, the next step involves the second rule of troubleshooting: substitution. In this case, swap a monitor, then a cable that works properly. If your system works with the substitute, then you've isolated either the faulty monitor or cable, which you may then be able to repair or replace.

If simple substitution does not pinpoint the problem, then you move to the next level of complexity: open the computer, ground yourself (by wearing a static-discharge bracelet, for example) to avoid discharging static electricity into the chips, and locate, clean, and replace the I/O chip—usually seated in a socket—that controls the monitor. To identify the I/O chip, you need to refer to a schematic diagram that labels the placement and function of each chip on the board. Schematics are sometimes included with operating manuals or can be readily obtained from a dealer or manufacturer.

Once you've found the chip, you can remove it with a small screwdriver or special chip puller and clean its metal pins with fine sandpaper.

Suppose you've cleaned and replaced the I/O chip and the monitor still doesn't work. Adhering to the rule of substitution, you replace the I/O chip with a known good chip. Almost all chips are available from electronic supply houses (see sidebar on page 136), except for manufacturer's ROM chips, which you can buy from some well-stocked dealers. Prices vary from as little as $2 to $5 for RAM chips, to $5 to $15 for microprocessor chips, to $15 to $50 or more for special ROM support, or graphics chips.

If replacing the I/O chip still doesn't solve the problem, you'll have to perform random chip substitution: replace all the socketed chips on the board one by one, and turn the system on between each substitution to see if it works. This diagnostic procedure, which takes from half an hour to an hour, is often the very first thing a repair technician will do. It's fast and easy but can be billed as if it weren't.

If all these steps don't pinpoint the source of the problem, then the third rule of troubleshooting comes into play: don't do anything else you don't know how to do. Now's the time to call on the professional technician who can desolder soldered chips and employ more sophisticated diagnostic tools. But by that time, you'll often have a fairly clear picture of where the problem lies, be able to save the technician time and save yourself money and downtime, and have a good sense of what you should be charged. You'll also impress the heck out of the technician, who will be more likely to treat you fairly.

Tools and Know-how

As you can see by tracing the preceding steps involved in troubleshooting an ailing monitor, a little technical information and a few tools go a long way in solving a problem. Requisite tools include small screwdrivers (Phillips head and regular),

—*Continued on page 136*

POPULAR REVIEWS

YOUR GUIDE TO GENUINELY USEFUL COMPUTER SYSTEMS, PERIPHERALS, SOFTWARE, AND BOOKS

Hardware

Zaisan ES.3 does it all.

Sooner or later it was bound to happen—someone would design an all-in-one personal computer that could run popular software, easily share data with other systems, and use advanced processing techniques to manage your telephone calls. The idea isn't new, but only now are the systems emerging in the marketplace. This month's reviews include an in-depth look at one of the first such computer-phone systems—the **Zaisan ES.3**. It controls two voice and data telephone lines, even includes a telephone handset, and runs most software developed for the IBM PC. But what makes the Zaisan system stand out is its price—it sells for no more than a typical personal computer.

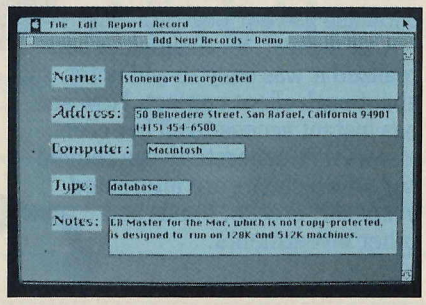
If you've been watching for the second-generation laptop computers, we review the **Tandy 200**—the enhancement of Radio Shack's popular Model 100. —DENNIS ALLEN

Software

Business programs come in all sizes and shapes, so manufacturers are honing their products' fine points in an effort to capture your attention—and business. For example, **Peachtree's Back to Basics** is a three-in-one accounting package designed for businesses with assets up to $21 million; it's exceptionally well integrated and reasonably priced. Among the many databases for the Macintosh, **DB Master** stands out as one that works equally well on 128K and 512K Macs; it also takes complete advantage of the Mac's unique user interface to make database design and maintenance nary a chore at all. **Overhead Express**, a program for creating transparencies for use with overhead projectors, greatly simplifies in-house production of artwork. Writers will be interested in **Maxthink**, a slick outline generator and brainstorming tool.

But there's more to life than business, so we also review two fitness programs, the **Original Boston Computer Diet** and the **Fixx Running Program**. —BEVERLY CRONIN

DB Master is a cinch to use.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Add New Records - Demo
Name: Stoneware Incorporated
Address: 50 Belvedere Street, San Rafael, California 94901
(415) 454-6500
Computer: Macintosh
Type: database
Notes: DB Master for the Mac, which is not copy protected, is designed to run on 128K and 512K machines.

Books

Quick—who invented the semiconductor? As this month's lead review reveals, the answer to this question is only the jumping-off point for **The Chip**, T. R. Reid's illuminating, entertaining, and wide-ranging history of the early development of silicon circuitry. In Micro Reviews Mike Nicita and Ron Petrusha evaluate current selections on applying the computer to investing, using BASIC for the Macintosh, understanding dBASE III, working with the Unix System V, and learning Symphony basics. —TOM MCMILLAN

What's a Wall doing with a da

"Cornerstone lets me do more with my PC than I could ever do with my spreadsheet."

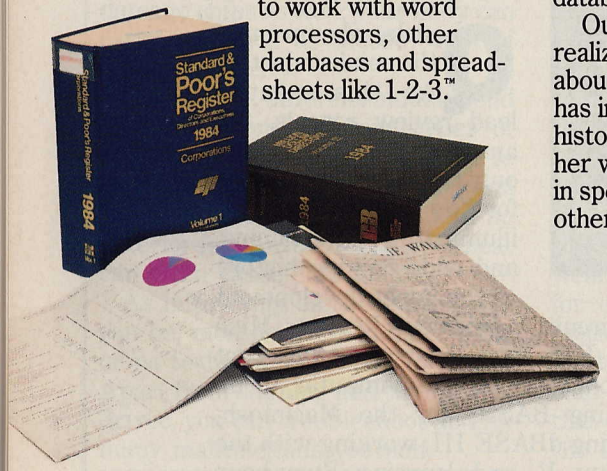
Until now, unless you had time to learn computer programming, you were unable to realize the full potential of your personal computer.

That's why we created Cornerstone,™ the first sophisticated database system specifically designed for the non-programmer.

And Cornerstone isn't one of those lightweight systems that handles only a few simple jobs. On the contrary, it's a full-featured relational database system that can help you solve the wide range of information management problems you face every day.

"It takes over where my spreadsheet leaves off."

No single program can meet all your information management needs. That's why we designed Cornerstone to work with word processors, other databases and spreadsheets like 1-2-3.™



For example, spreadsheets are great for budgeting and forecasting, and our analyst uses 1-2-3 to forecast investment performance. But she also has a business to manage, and Cornerstone is perfect for that. She started by building a database of all her clients. Now Cornerstone keeps track of expenses, generates bills and even organizes her schedule.

You'll be able to build your own database easily with Cornerstone. Our *Beginner's Guide* and *On-Screen Tutorial* teach you everything you need to get started. And if there's any doubt about what to do next, our unique Help and Options keys always explain where you are and what to type next.

"Now I can keep all my clients' histories in one place."

Cornerstone's flexible design makes it easy to modify your database as your needs change.

Our analyst, for example, soon realized it was easy to add notes about each client contact. Now she has instant access to all her client histories. Cornerstone can remind her which clients are interested in specific stocks, bonds and other investments.

J. W.,
Financial Analyst

Cornerstone is a trademark of Infocom, Inc. IBM is a registered trademark of International Business Machines Corporation.
1-2-3 is a trademark of Lotus Development Corporation. Tandy is a registered trademark of Tandy Corporation.

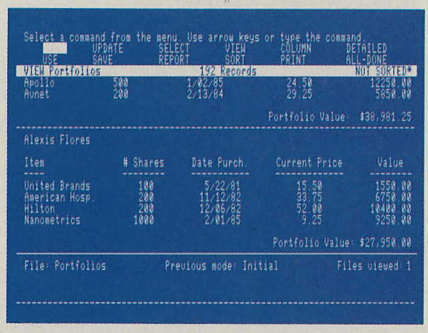
Street analyst abase system?

Unlike other systems, with Cornerstone you won't have to decide in advance how much space you'll need for any item in your database. Cornerstone automatically makes room for a second phone number, an additional address, or even two pages of notes. And Cornerstone is efficient—it only uses as much space as you do.

"I know the current value of every portfolio."

Business people often need to use the same information in different ways. Because Cornerstone is a full-featured relational database, you only type in information once, but you can use it in as many ways as you want.

For instance, our analyst uses her data about companies and stock performance to keep track of each client's portfolio. And when she changes the price of a stock in one place, it's automatically changed in all relevant portfolios.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USE UPDATE SELECT VIEW COLUMN DETAILED
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VIEW Portfolios 192 Records NOT SORTED
Apollo 500 1/02/85 24.50 12250.00
Avnet 200 2/13/84 29.25 5850.00
Portfolio Value: $38,981.25
Alexis Flores
Item # Shares Date Purch. Current Price Value
United Brands 100 5/22/81 15.50 1550.00
American Hosp. 200 11/12/82 33.75 6750.00
Hilton 200 12/06/82 52.00 10400.00
Nanometrics 1000 2/01/85 9.25 9250.00
Portfolio Value: $27,950.00
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"I create reports I never dreamed of with my spreadsheet."

Providing information to others is an essential part of every professional's job. With Cornerstone's built-in report writer, you can give people the information they want, the way they want it.

preferred stock and provide her clients with detailed reports on them. She can also use Cornerstone's menu-driven convert system to easily transfer information from her 1-2-3 spreadsheets into her Cornerstone reports.

Cornerstone is a different kind of database system. Created by a company committed to eliminating the barriers between computers and people. It's now available for the IBM® PC, PC XT,™ PC AT™ and compatibles, and soon for the Tandy® 1000, 1200 HD and 2000. Suggested retail price of $495.

Send for your free demo disk.

To fully appreciate how different Cornerstone really is, you have to try it yourself. For a free demo disk and brochure on the database system that's easier to use than a spreadsheet, call 617-574-0644. Or write to Infocom, Inc., Dept. D, 125 CambridgePark Drive,

INFOCOM™

I've got to see it to believe it.

Send me a Cornerstone demo disk.

Name_____

Title_____

Company_____

Address_____

City_____ State_____ Zip_____

Do you use an IBM® PC or compatible?_____

Are you currently using a database?_____

Which one?_____

Are you currently using Lotus™ 1-2-3™?_____

L

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What's a Wall
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That's why we designed
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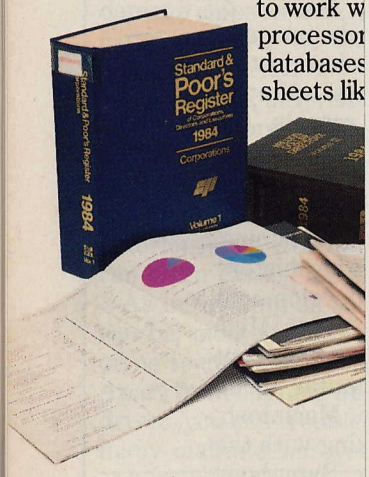

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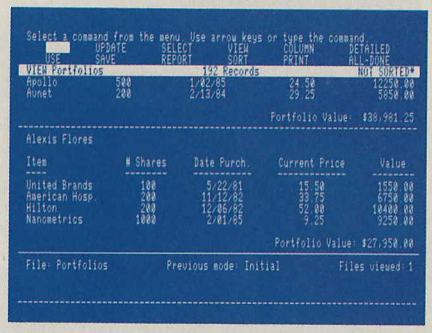

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The Zaisan ES.3

An integrated voice and data computer workstation that can manage telecommunications and run MS-DOS software

For years the battle cry of software marketers has been integration. The motto "Give it to 'em all in one package" has set more than one program packager on the trail to financial success.

But hardware manufacturers, for some unfathomable reason, have been slow to climb aboard the integrated bandwagon. Computers are today, as they have always been, primarily number and word crunchers—the idea of adding noncomputer features has always been regarded with disdain.

But times are changing. At least a half-dozen companies, including telecommunications veteran AT&T, are now either developing or already selling their own versions of integrated workstations. One of these firms is the Houston-based Zaisan Corp., which makes the Zaisan ES.3, a combination IBM PC-compatible desktop computer and telecommunications management system.

An Overview

Like any good desktop workstation, the ES.3 comes in a neat bundle. The light gray system unit occupies only slightly more desk space than a typical multiline telephone. But Zaisan manages to cram a lot into a little package. The ES.3's standard features include 8088, Z80, and 6805 microprocessors, 128K bytes of RAM (expandable to 640K bytes), 8K bytes of nonvolatile CMOS RAM, a 5¼-inch floppy-disk drive, a 300-baud internal modem, a parallel printer port, a 9-inch video display,

PHOTOGRAPH BY MIKE BLAKE

a detached typewriter-style keyboard, a telecommunications keyboard, and a telephone handset.

The ES.3 is a completely integrated system. The computer's video display and disk drive assembly are mounted atop the system unit (the system is shipped detached); the telephone handset is attached to the unit's left side. A 44-button "dashboard" set of keys, which controls the telecommunications functions, is located on the top of the system cabinet. The only part of the ES.3 that extends out of the unit's cabinet is its 82-key keyboard, but even that tucks neatly beneath the console when not in use.

The high-resolution, 9-inch, green-phosphor CRT displays characters in an 8 by 12 dot matrix. The display emulates IBM's color graphics card (colors are displayed in eight intensity levels).

Included within the system's ROM is an extensive array of what its manufacturer calls "personal support software." Controlled by the system's Z80 microprocessor, the software provides a phone directory, calendar and appointment reminder, electronic scratch pad, and phone log. A password-based security system keeps prying eyes away from your sensitive data created with the support software.

All of the built-in applications interface with the system's real-time clock. The phone log, for example, can automatically record the number, time, date, and duration of each call dialed; and the appointment reminder will provide a gentle audible beep when you're due at a meeting or have to call an important client. A small lithium battery provides power to the clock even when the power is turned off (Zaisan predicts the battery will last up to five years).

A row of "soft keys" mounted on the system's dashboard supplies single-keystroke access to frequently used commands. Under some of the personal support programs the soft keys are programmable by the user.

The built-in software is supported by its own 8K-byte bank of CMOS RAM that is expandable (with optional 8K-byte modules) to a maximum of 32K bytes. This memory,

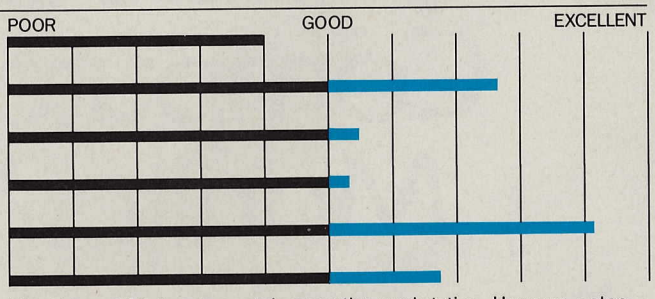
How Do I Choose the Right Personal Computer Monitor?

also powered by the internal battery, stores data created by the support software. With Zaisan's optional RS-232C/cassette recorder interface, personal support software files can be transferred to an audiocassette.

Another feature of the ROM is its diagnostic routine that automatically checks each of the system's major components. The routine is invoked each time the computer is powered up and takes about 30 seconds to run its course. Also, a collection of more extensive diagnostic programs is supplied on an accompanying disk.

AT A GLANCE

The Zaisan ES.3



Reviewer's Note: The Zaisan ES.3 is a top-notch executive workstation. However, potential buyers should be aware that the system lacks hardware compatibility with the IBM PC, a built-in answering machine, and the ability to provide unattended operation.

Manufacturer: Zaisan Inc., Suite 400, 14511 Falling Creek, Houston, TX 77014; (713) 580-6191

Standard Features: 8088, Z80, and 6805 microprocessors; 128K bytes of RAM (expandable to 640K bytes); 8K bytes of CMOS RAM (expandable to 32K bytes); one 5¼-inch floppy-disk drive; 9-inch green-phosphor display; detached typewriter-style keyboard; telephone keypad; 300-baud modem; telephone handset; MS-DOS 2.1; ROM-based phone directory, calendar, appointment reminder, electronic scratch pad, phone log; system diagnostic disk

Base List Price: $2595 ($3295 with dual disk drive and 256K bytes of RAM)

Options: Second 5¼-inch floppy-disk drive ($495); 1200-baud modem ($495); RS-232C and cassette recorder interface ($175); 8K-byte memory modules ($125)

Operating the ES.3

The ES.3 supports either one or two phone lines, and the easiest way to get acquainted with the system is to make an ordinary voice call. Lifting the telephone handset automatically selects line one; however, either line can be accessed by pressing one of the two line buttons on the system's dashboard. To dial a number, you merely press the dial keys on the dashboard. (These keys are just like the ones on a standard push-button telephone.) You can also use the system's built-in speakerphone to talk with clients and associates while keeping your hands free for shuffling through papers.

Of course, you don't have to dial a number manually. You can either program the ES.3 to dial the number from memory (up to 11 dashboard keys are programmable for one-button dialing), or you can direct the system to dial a number from the support software's phone directory. In either case, you can select pulse or tone dialing or even customize the unit to work with a private branch exchange in your office. The system's 6805 microprocessor controls all of the ES.3's telecommunications functions.

Like any good office telephone, the ES.3 provides a variety of call management features. With the dashboard controls you can teleconference with two outside callers, place calls on hold, terminate calls, redial busy numbers automatically, raise or lower speaker volume, and mute the handset or speakerphone's microphone.

Data Communications

While the ES.3 works fine as a full-featured office telephone, the system excels as a data terminal. Built into the ES.3 is a telecommunications program that lets you tailor the system to specific on-line databases. The program allows you to specify baud rates, parity settings, log-on sequences, and other vital information. The log-on feature is capable of fully automatic logging-on to different services.

You can create individual communication "profiles" that contain the phone number, communication parameters, and sequences for each on-line service you regularly use and store them in the system's memory. The ES.3 can store up to nine profiles (including a preprogrammed default profile), which can later be retrieved from the system's dashboard with a single keystroke.

The ES.3 also makes quick and easy work of uploading and downloading data. For example, if you need to download stock quotes several times a day, you could use the system's soft keys to create a file that—at the touch of a single key on the dashboard—automatically logs onto Dow Jones, accesses requested quotes, and stores them in a scratch pad file called "Quotes." You could also upload information or electronic mail from the scratch pad with a single keystroke.

Thanks to the ES.3's logical command structure and easy-to-understand menus, the soft-key programming process is really quite easy. It took me only about a half hour to fully program the ES.3 to log on to Compuserve and transfer my waiting Easyplex mail into the text editor.

However, no system is perfect. One important element missing from the ES.3's telecommunications features is the support of a sophisticated error-checking protocol, such as XMODEM, which automatically verifies that transmitted data has been received correctly. The absence of such a feature when using the optional 1200-baud modem ($495) under noisy line conditions could be disastrous to your data, with problems ranging from incorrect numbers or letters to completely scrambled files.

The ES.3 As PC

Pressing the mode button on the ES.3's dashboard displays the system's personal computer functions. Like other IBM PC compatibles, the ES.3 uses an 8088 microprocessor, and it is bundled with Microsoft's MS-DOS operating system.

MS-DOS enables the ES.3 to run a wide range of software designed for the IBM PC, making the ES.3 data compatible with the IBM PC. And since the MS-DOS programs and personal support software are controlled by separate microprocessors, you can easily switch from an MS-DOS program to a personal support program. While entering data into your favorite word-processing program, for example, you can hit the mode key and pluck a name and phone number out of the built-in phone directory.

I tested the ES.3 with such favorites as Lotus Symphony, The Home Accountant Plus, Wordstar, Spellstar, Infostar, and Microsoft's Flight Simulator. All these programs worked well, although you must install these packages with Zaisan's customized version of MS-DOS. However, some programs, such as Ashton-Tate's Framework, may require special modification to run on the ES.3. The problem stems from the ES.3's lack of a minus key in the numeric keypad. To remedy this, Zaisan says it will make the modification for you or tell you how to handle the job yourself.

Hardware Considerations

While connecting an external printer, plotter, or modem will prove no problem, the computer fails to offer any IBM PC-compatible expansion slots. Therefore the ES.3 is only data compatible with the IBM PC. Those interested in adding a multifunction, memory, or other special-purpose expansion card will find themselves out of luck. However, Zaisan says it plans to offer an IBM PC-compatible expansion chassis in the future, though no details were available at press time.

For now, at least, the only IBM PC plug-compatible component is the ES.3's replaceable keyboard. And, as I discovered the moment my fingertips touched it, the keyboard is a

Will It Work with My PC?

Before you can experience the full capabilities a high performance monitor offers, it has to work with your personal computer. That's why Princeton Graphic Systems makes high resolution monitors compatible with most popular brands of personal computers. IBM, Compaq, Corona, Apple and more. But we go one step further. By paying close attention to ergonomic detail, we make Princeton Graphic Systems monitors compatible with you, the computer system user...

device you'll certainly want to replace. It has a terrible feel; it's much too stiff for any sort of long-term typing. Also disconcerting, the space bar seems to bend forward instead of traveling directly downward when you strike it.

Unlike the IBM PC's keyboard, the ES.3 unit fails to offer a height adjustment mechanism. This omission can prove inconvenient, especially if you're very tall or the desk you're using is very low. I happen to be tall, so I had to prop up the keyboard with a couple of paperback books. It also would have been nice if Zaisan had included indicator lights on its Caps Lock and Num Lock keys, as many other manufacturers do. On the plus side, the keyboard does have its shift keys in the correct locations, a situation IBM itself has had a hard time dealing with.

My only other criticism of the ES.3 concerns some features the company elected to omit. I'm puzzled as to why Zaisan failed to include a voice answering device in its unit. The ES.3 can automatically answer and receive electronic data messages, but it fails to offer a companion voice capability—not even a simple tape recorder. It seems that such a feature would be very useful to harried executives who are often called away from their desks or too busy to be interrupted.

A Zaisan spokesman said the company's decision to omit this feature was "a matter of dollars and resources." The spokesman added, however, that plans for a voice answering option are "in the works."

Even more annoying is the lack of a provision for unattended operation. The ability to upload or download data during off-rate late night and early evening hours would have been a big plus. When you consider that the ES.3 is already equipped with a clock and user-programmable function keys, the omission comes across as a major oversight.

Documentation

On a better note, the documentation provided with the ES.3 is first-rate. A pair of loose-leaf binders contain information on the unit's personal computer functions and MS-DOS. A bound manual provides details on the ES.3's telecommunications and personal support software features.

All in all, the documentation is well written. Zaisan's technical writers have recognized that their machine is far more than just a run-of-the-mill MS-DOS computer and have taken pains to clearly explain all of the system's unique features. The complicated process of customizing the system's elaborate dashboard and phone directory is deftly handled.

Overall, I was impressed with the ES.3. The machine is solidly constructed (although the keyboard is a bit too solid), and during the many hours I tested it, I didn't experience a single hardware or software failure. The system's telecommunications features were easy to use and would be genuinely helpful for any executive. And as a personal computer the ES.3 functions at least as well as the IBM PC.

Despite a few nagging drawbacks, Zaisan's ES.3 is a winner.

—JOHN EDWARDS

John Edwards is a freelance writer living in New York.

The Tandy 200

Tandy surpasses its Model 100 with an enhanced second-generation laptop computer

A breakthrough—that's what most people called Tandy's Model 100 laptop computer when it was introduced some two and a half years ago. A simple concept executed with elegance, the Model 100's true portability and built-in applications software made the tiny machine a huge success. But even breakthroughs have their limitations, and the Model 100's were its small display and memory size.

Now Tandy has a new laptop computer, an enhanced version of the Model 100 called the Tandy 200. The new system has a flip-up LCD, 24K bytes of RAM, 72K bytes of ROM, and built-in applications software that includes Multiplan, Microsoft's popular spreadsheet, all for $999.

In a 4-pound package that is virtually the same size (11¾ by 8½ by 2$^{3}/_{16}$ inches) as the Model 100, Tandy has made impressive improvements in its new laptop computer.

PHOTOGRAPH BY MIKE BLAKE

Legible LCD

The most distinctive feature of the Tandy 200 is its 7¼- by 4¼-inch flip-up LCD screen, which closes over the keyboard during moving or storage to prevent damage to either component. The display is twice the size of the Model 100's, showing 16 lines instead of 8. The screen can show up to 640 characters—enough for a solid paragraph or two of text. The LCD's contrast is adjustable with a control on the side of the case.

Tandy kept its low-resolution 40-column display format rather than opting for an 80-column LCD like the one on the NEC Starlet (see *Popular Computing*, June 1985). As a result, the Tandy 200 has one of the easiest-to-read LCD screens of any portable computer—characters can be twice as wide when there are only half as many per line. The obvious trade-off, of course, is that less text can be displayed at a time.

The keyboard is still a full-size QWERTY layout with 8 programmable function keys. These are now centered above the top row of the QWERTY keys, rather than grouped on the left side (as they were on the Model 100), and the arrow keys are larger and clustered in a logical diamond arrangement.

The Tandy 200 and the Model 100 both have built-in, auto-dial 300-baud modems; however, the Tandy 200's modem has a tone-dialing feature lacking in the 100's. Both machines also come with I/O ports for the system bus, a bar-code reader, an audio-cassette recorder, RS-232C devices, and a Centronics-compatible parallel printer.

The RS-232C port, however, is not the same on both machines. The Model 100's serial port will communicate with another computer with just the send and receive wires (2 and 3) reversed, but the Tandy 200 requires a null-modem adapter ($29.95), which also switches the data set ready (DSR) and data terminal ready (DTR) wires (6 and 20). The adapter lets host computers bypass an initial cycle of searching for the DSR and DTR signals, which often results in the loss of the first several bytes of data transmitted from the Model 100.

The Tandy 200, like its predeces-

Does It Give Me A Bright, Sharp Image?

Take a close-up look at the display. Bright, crisp characters and sharp, colorful graphics mean you're getting a high-quality image. The kind of image that comes with every Princeton Graphic Systems' monitor. Because Princeton Graphic Systems combines flicker-free technology, a fine dot pitch, and a nonglare screen to give you an image that *PC World's* World Class Survey rates number 1 . . .

sor, is powered by four AA batteries, which provide 10 to 15 hours of operation, or an optional external AC adapter ($5.95). The on/off push-button switch is conveniently located on top of the console. After 10 minutes of no activity, the machine turns itself off to conserve its batteries. The auto-off time interval can be easily changed with a BASIC command.

You can also instruct the computer to turn itself on at a set time and execute a BASIC program. A sample program listing that automatically logs on Dow Jones News/Retrieval and requests and stores stock quotes is included.

Also like its predecessor, the Tandy 200 uses low-power CMOS circuitry. At its heart is an 80C85 processor running at 2.4 MHz—the same as the one found on the Model 100. Unlike its predecessor, however, the Tandy 200's CMOS RAM can be expanded to 72K bytes. The Model 100 was limited to 32K bytes of RAM, and when that was full, you had to dump the memory contents onto a cassette tape or transfer it to another computer. The Tandy 200 overcomes this limitation by using three 24K-byte memory banks with a menu-driven copy command that moves data files from one bank to another.

But this arrangement has limitations, too. The operating system uses about 5K bytes of each RAM bank, leaving only 19K bytes per RAM bank for your files and documents. And because the RAM banks are separate, you cannot create a file or continuous document longer than 19K bytes—even if you expand the system to its maximum capacity. You must break a longer document into modules of 19K bytes or less.

On the positive side, a ROM socket on the Model 200 accepts up to 32K bytes of additional "firmware" (programs stored on ROM chips). There is currently a growing library of such programs available for the Model 100 from third-party suppliers, so it's a safe bet that similar firmware for the Tandy 200 will also become available.

Enhanced Software

Tandy has made many changes in the software built into its new machine—some subtle, some striking. The operating system, written by Microsoft, offers the same extraordinary ease of use found on the Model 100. However, to implement such tricks as RAM bank switching, the operating system had to be redesigned. For that reason, only BASIC programs not dependent on software routines stored in either system's ROM will run on both machines.

Two additions to the familiar menu-driven screen and clock functions are a command to delete files from the system's main menu and a neat little routine that displays the length, in bytes, of a selected file.

Also added is a calculator mode that you can invoke at any time with the Num and Graph keys. The top line of the screen, regardless of what else is displayed, becomes a temporary window for a 4-function calculator.

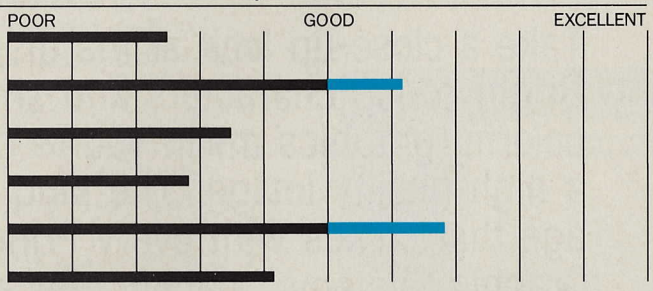
The calculator uses several of the keys on the right side of the keyboard to emulate a calculator keypad. Although the numeric keys are clearly marked, the four arithmetic function keys do not have legends, so unless you use the calculator often, you'll probably fumble around the keypad hunting for the correct key.

One of the more interesting new features in the Tandy 200 is the alarm function, which operates even when the machine is turned off. To set the alarm, you create a data file with a date, time, and reminder message. When the date and time arrive, the computer sounds an alarm for three seconds and displays the message on the bottom line of the screen. After a few minutes the computer will turn itself off to conserve battery power.

If you are in the middle of another program when the alarm goes off,

AT A GLANCE

The Tandy 200



Reviewer's Note: The portable Tandy 200 is forgiving and easy-to-use in all its applications. Its one maddening frustration is the 19K-byte RAM bank limitation, and I hope that some third-party developer (or maybe even Tandy) will offer a product that will solve this problem.

Manufacturer: Tandy Corporation, Ft. Worth, TX 76102; (817) 390-3300

Standard Features: 2.4-MHz 80C85 CMOS microprocessor; 72K bytes of ROM, expandable to 104K bytes; 24K bytes of RAM, expandable to 72K bytes; flip-up 16-line by 40-column LCD; RS-232C serial port; Centronics-compatible parallel printer port; full-size QWERTY keyboard with 8 programmable function keys, 4 dedicated function keys, 4 cursor-control keys, Graph, Num, Code, Control, and Esc keys; bar-code reader interface; 300-baud tone or pulse auto-dial modem; system bus interface; cassette recorder interface for data storage; built-in software including text editor, address organizer, scheduler, alarm, calculator, Microsoft BASIC, Multiplan, Telcom communications program

Dimensions: 11¾ by 8½ by 2 3/16 inches; weighs 4 pounds

Base List Price: $999

Options: 24K-byte RAM chips ($249.95 each); video/disk interface ($499); bar-code reader ($99.95); parallel printer cable ($14.95); direct-connect modem cable ($19.95); acoustic coupler ($39.95); soft carrying case ($39.95); CCR-82 data cassette recorder ($49.95); null-modem adapter ($29.95); AC adapter ($5.95)

you'll hear only the tone; the message will not appear until you return to the main menu. If you are away from the computer and miss the alarm, the next time you turn on the computer the message will flash across the bottom of the menu screen.

You can store many alarm messages in the data file (you're limited only by file space in RAM), and the dates can extend years into the future—a handy reminder.

Multiplan Now Included

The most striking addition to the Tandy 200's applications menu is Multiplan. A surprisingly full implementation of Microsoft's well-known spreadsheet, Multiplan includes over 50 commands, functions, and options. The 8 most popular commands are menu-driven. The screen accommodates 15 rows and 4 columns of the spreadsheet (Multiplan's total capacity on the Tandy 200 is 99 rows by 63 columns, or 6237 cells).

Less flashy is the enhanced text editor. While Tandy has always preferred to call the program a text editor rather than a word processor, the enhancements certainly move the program closer to the latter. The new text editor, like its earlier version, includes the ability to execute a global search and to define blocks and remove, relocate, or copy them into a different file—a trick many larger word processors cannot do.

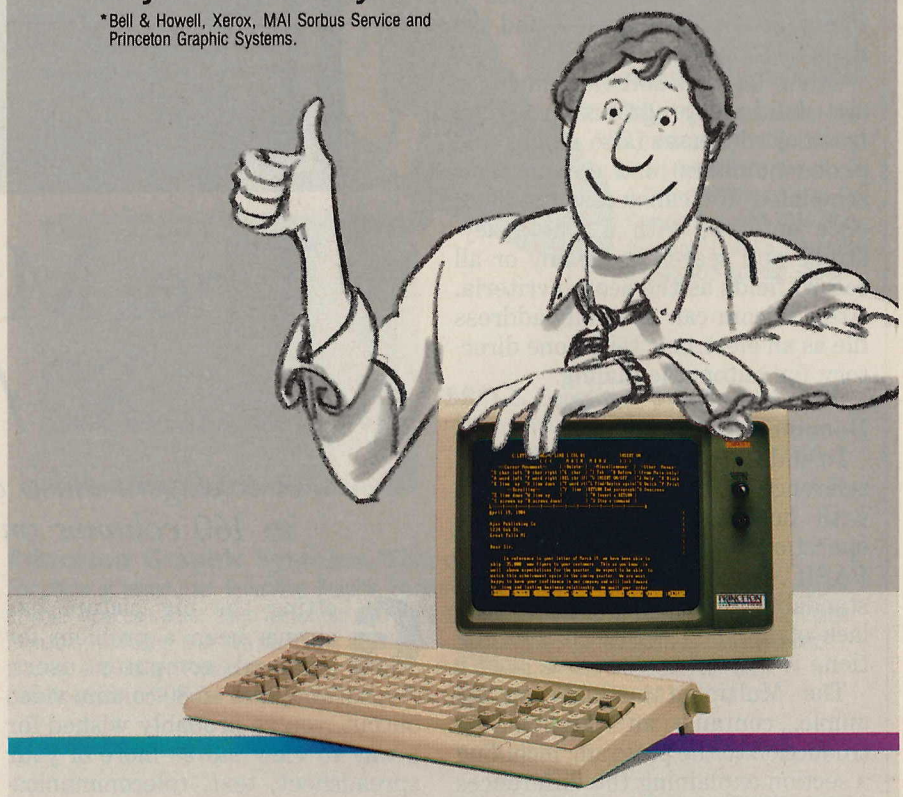
The major improvement has been to remove an annoying weakness of its predecessor by substantially expanding its printout capabilities. The Model 100's text editor allowed you to select only the line width and print either the contents of the screen or the entire document. The text editor on the Tandy 200 lets you set margin controls, page length, and number of lines per page; it also lets you pause between pages to feed single sheets of paper to your printer.

All this adds up to a program that will satisfy most of your on-the-road business requirements while providing a way to create longer or more complex documents that can later be easily transferred to a larger computer.

How About Dependability?

You rely on your personal computer system to help get your work done. That's why it's important to choose a monitor built for reliability. Princeton Graphic Systems monitors are built under the highest quality control standards, backed by a full one-year warranty and supported by a nationwide service network.* The result: monitors that perform when you need them, day in and day out . . .

*Bell & Howell, Xerox, MAI Sorbus Service and Princeton Graphic Systems.



Also improved is Telcom, the built-in communications software that controls both the internal modem and the RS-232C port. It is capable of communicating from 75 to 19,200 baud (although the modem is fixed at 300 baud). It includes a control-character filter and a stop/start protocol. But the new Telcom does not include error-checking protocols or the ability to display files while you're on-line.

When using the internal modem, Telcom can pulse dial at either 10 or 20 pulses per second or generate dialing tones for faster dialing. It can also configure the computer to run in either the originate or answer mode, functions that are controlled by external switches on the Model 100.

Another convenient feature of Telcom, usually found only in dedicated communications software, is the ability to log on automatically to a computer database. Using the text editor, you simply write a line of text that contains the name of the database, phone number to dial, the characters that the database will use to interrogate the Tandy 200, and the response log-on data.

Other built-in software includes two database programs that keep track of addresses (also names and phone numbers) and appointment schedules. You can access the data, once entered, with a single keystroke and search using any or all record fields as the search criteria. Also, Telcom can use your address file as an electronic telephone directory for automatic dialing.

Documentation

In addition to a User's Guide and reference card, the Tandy 200 comes with booklets that describe the operation of Multiplan, Telcom, and BASIC. The manuals, though understandable, are disappointing in their lack of detailed technical information.

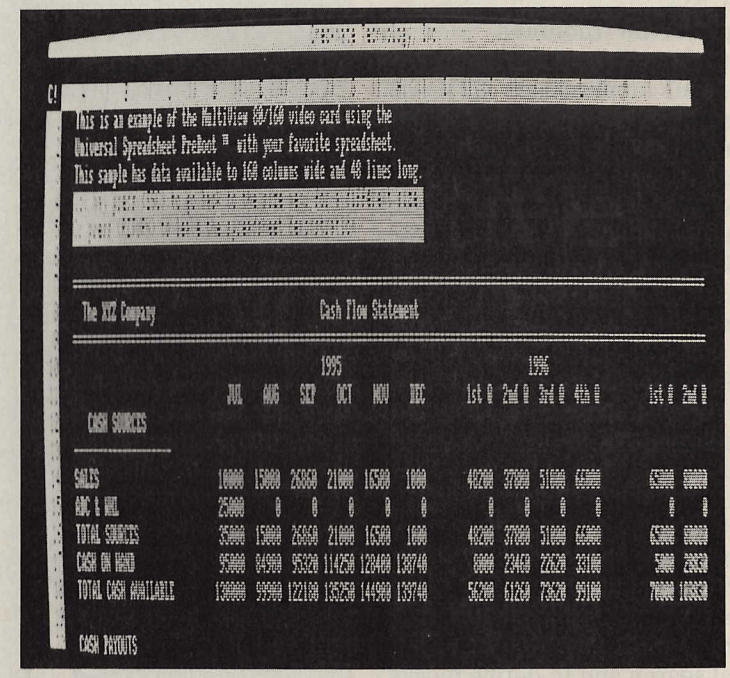
The Multiplan manual, for example, contains an excellent introduction to the program, including a section explaining the differences between this program and its famous competitor, Visicalc. But missing is the sort of technical information that would help you transfer Multiplan spreadsheets to another computer and vice versa.

In fact, Tandy may have missed an opportunity to broaden its base of laptop computer users by following its typical xenophobic policy of not documenting compatibility with other operating systems or computers. Yet the Tandy 200's text editor creates standard ASCII files, and Telcom can easily transmit them to any serial-port-equipped personal computer. An IBM PC user, however, would never know that from reading the Tandy manuals.

But these are relatively minor drawbacks. The Tandy 200 is a solidly built and beautifully functional portable computer. It surpasses the Model 100 and all other competitors in the under-$1000 category.

—THOM HARTMANN

Thom Hartmann is a freelance writer living in Marietta, Georgia.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Universal Spreadsheet Preboot ™ with your favorite spreadsheet.
This sample has data available to 160 columns wide and 40 lines long.
The XYZ Company
Cash Flow Statement
1995
1996
JUL AUG SEP OCT NOV DEC 1st Q 2nd Q 3rd Q 4th Q 1st Q 2nd Q
CASH SOURCES
SALES 10000 15000 26000 21000 15300 1000 40200 37000 51000 65000 63000 60000
ADC & MISC 25000 0 0 0 0 0 0 0 0 0 0 0
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TOTAL CASH AVAILABLE 130000 99900 122100 135520 144980 139740 56200 61260 73620 99100 70000 108020
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The Multiview 80/160

An intelligent video card that gives you up to 160 columns on your Apple II or IIe

Getting the big picture has always been a problem for personal computer users. Even if you have an 80-column video output, you've probably wished for a way to view *more*—more of your spreadsheet, text, telecommunications, or whatever—on your video screen.

Unfortunately, manufacturers have had a difficult time expanding the traditional 80-column format. The problem is twofold. First, video displays are very memory-intensive, and until recently memory has been an expensive commodity. Second, many older monitors had trouble clearly showing even an 80-column display. With these drawbacks, only a handful of manufacturers have ever tried to produce an expanded video display—and most of those at-

PHOTOGRAPH BY MIKE BLAKE

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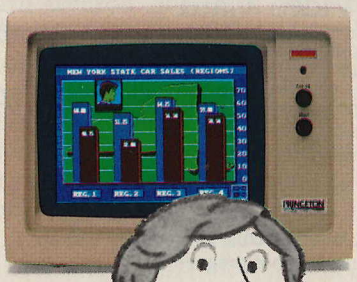

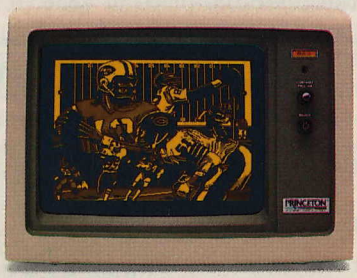

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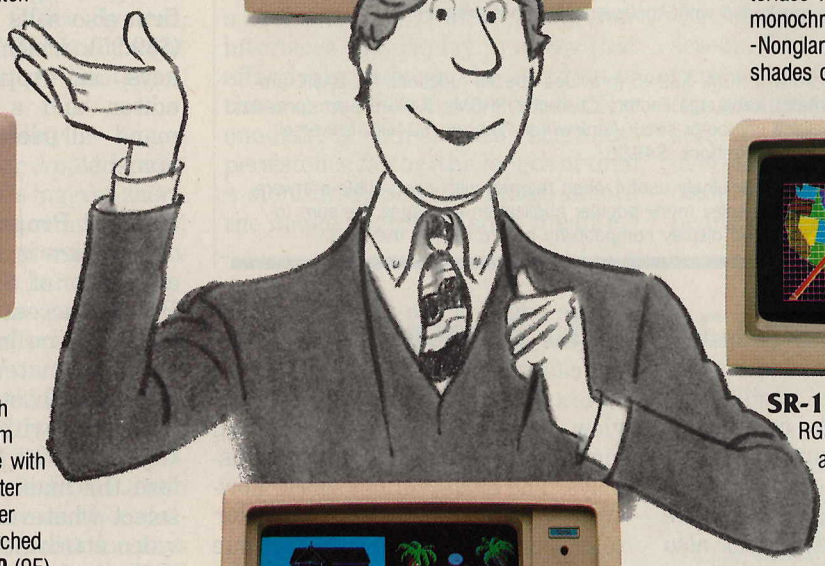

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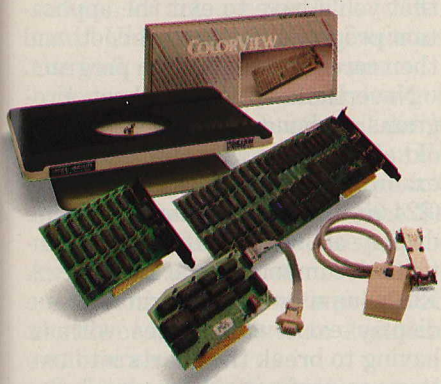

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tempts have met with failure.

Now a Tempe, Arizona-based company named Checkmate Technology has developed the Multiview 80/160, a plug-in video card for the Apple II and IIe that promises to deliver crystal-clear, extra-wide output at the tolerable price of $350.

AT A GLANCE

Multiview 80/160 Video Card

Manufacturer:	Checkmate Technology, 509 South Rockford Dr., Tempe, AZ 85281; (602) 966-5802; (800) 325-7347
Uses:	Provides extra-wide and extra-long screen displays ranging from 80 to 160 columns across and 24 to 51 lines down on Apple II and IIe, Franklin Ace, and BASIS 108 computers
Standard Features:	Seven screen sizes (80 by 24, 80 by 32, 96 by 24, 80 by 48, 132 by 24, 132 by 30, and 160 by 24); normal, inverse, and underlined characters; two intensity levels; reverse scrolling; eye-saver display mode; packaged with Appleworks Preboot program
Base List Price:	$350
Options:	Superworks PROM, $39.95 (provides special functions for BASIC programmers); Language Factory Character PROMs, $44.95 each (provides specialized character sets); Applewriter Preboot, $24.95; Universal Spreadsheet Preboot, $49.95
Reviewer's Note:	Multiview is genuinely useful when teamed with compatible software, but it won't display many popular application packages. Be sure to check for video display compatibility before buying the card.

Taking a Look

Multiview is painless to install. You merely plug the card into slot 3 of your Apple and route a cable from a jack on the card to the computer's rear-panel video output jack. Connecting your monitor cable to a second jack on the card completes the job. (Apple IIe owners must also move a special connector on the card that allows programs to access both Multiview's video attributes and the memory on an Apple Extended 80-Column Card.) The entire process takes about five minutes.

Once installed, Multiview is ready for action. The card partitions the screen into two unequal areas. The upper part can be formatted to show from 80 to 160 columns of characters and 24 to 48 lines in the following increments: 80 by 24, 80 by 32, 96 by 24, 80 by 48, 132 by 24, 132 by 30, and 160 by 24.

The smaller display area includes from one to five prompt lines at the screen's bottom edge. These lines can be used by program developers to provide menu choices or Help information. If your Apple is equipped with a Thunderclock Plus clock/calendar card, the prompt lines will display the current date and time.

Multiview also displays normal, inverse, and underlined characters, two intensity levels (useful for highlighting text and numerical data), and reverse scrolling. An eye-saver mode stretches text lines to the extreme edges of the display, expanding the spaces between characters for easier viewing.

According to Checkmate, Multiview will work with virtually all high-quality monochrome video displays. The card will not work, however, with black-and-white or color television sets or color monitors due to the relatively poor video resolution of these units.

Getting Acquainted

Multiview comes with a demonstration program on disk that familiarizes you with the card's features and shows how the card works with various application packages. It also includes routines that let you test the card's circuitry and adjust your video display for maximum performance.

The first thing you'll notice after booting the disk is Multiview's outstanding clarity. Multiview doesn't skimp on character detail; each screen format produces sharp, distinct characters in a full 8 by 9 dot matrix. The card includes a 96-character ASCII set, true descenders on lowercase characters, and 32 graphics and special-purpose characters.

Another reason for Multiview's clarity is its ability to draw timing signals directly from the Apple's 6502 microprocessor. Earlier video boards usually generated their own sync signals, and that sometimes caused shaky and wavy displays when the card's signal was out of step with the Apple's internal timing. But Multiview's display appears as steady and glitch-free as Apple's own 80-column card.

The card also accepts alternate character-generator PROM (programmable read-only memory) chips. Checkmate offers language PROMs ($44.95 each) that give your Apple additional engineering, math, or foreign language characters. The firm also sells Superworks PROM ($39.95), which provides 10 macro keys, an Applesoft BASIC line editor, and a screen print command—all useful for program development.

Preboot Programs

Multiview is compatible, as is, with a variety of 80-column programs. But to access the card's special features, you have to purchase one of Checkmate's optional preboot disks (a preboot disk for Appleworks now comes with the Multiview card). If you run the preboot program before the main application, you can select whatever screen format and video attributes you desire. Unfortunately, however, the preboots do not allow you to change screen displays from within a program. To do that you'll have to exit the application program, run the preboot, and then rerun the application program.

Nevertheless, the preboot programs are handy and can show tired old applications in a new light. For example, the Applewriter Preboot ($24.95) and an 80-column by 48-line display allowed me to view a complete document page at a glance. A 132-column by 30-line format let me display extra-wide tables without having to break the charts into two or more confusing segments. I also appreciated the ability to switch to an inverse mode (black characters on a light background) that made the screen look like a sheet of paper.

I found the Universal Spreadsheet

Preboot ($24.95) equally useful. This program lets you use Multiview display formats with an extensive array of electronic spreadsheet systems, including Visicalc, Multiplan, Magicalc, The Spreadsheet, and Acecalc. An entire year's worth of sales predictions displayed on one screen is an intoxicating sight.

The only problem with the preboot packages is that there aren't enough of them. The Applewriter, Appleworks, and Spreadsheet packages are the only preboots the company currently offers. It would be nice, for instance, if Checkmate offered a package for one of the popular telecommunications programs. The firm promises more preboots in the near future (including packages for Letter Perfect, Magic Office System, Simply Perfect, and Zardax), but at the moment choices are limited.

Software Compatibility

As with many other Apple II add-on devices, Multiview's biggest shortcoming is in software compatibility. While Checkmate guarantees its card will work with a handful of application packages, the card doesn't even come close to offering 100 percent compatibility.

In a nutshell, Checkmate claims Multiview will work, or can be made to work, with most CP/M- or Pascal-based programs. Apple DOS 3.3 and ProDOS programs are another matter. Multiview's documentation says the card will support an Apple DOS 3.3 or ProDOS program only if it requires "no video drivers and is not written for any one particular video card." Unfortunately, that eliminates the bulk of Apple II software.

For example, while Multiview got along fine with Applewriter, it didn't work at all with Sensible Speller IV or PFS:Access. In fact, I couldn't even get those programs to boot. So while I was able to compose a document with Applewriter, I couldn't use my other software to proofread the file or transmit it to an electronic mail service.

I also found Multiview incompatible with such Apple II mainstays as ASCII Express Professional, Apple II Business Graphics, and Apple Quick File. Worst of all, to use these programs I was forced to disable Multiview, a process that involved popping my Apple's cover, removing the card, and rearranging the two video cables. Quite an effort, especially if you're forced to go through the routine two or three times a day.

Hardware Compatibility

Multiview also suffers from some hardware incompatibility. While the card worked fine with my Apple Monitor III, it provided a less than stunning image on my Zenith Data Systems display. No matter how precisely I adjusted my Zenith's controls, any screen image containing more than 24 lines caused my monitor's display to flicker madly.

According to Checkmate, when in a 24-line or higher mode, Multiview interlaces the display in a way that effectively reduces the number of times each video line is refreshed by one-half. If your monitor has a low persistence factor (the length of time a monitor displays an image before the image begins to fade), the interlacing will cause your display to flicker like a Keystone Kops movie.

The Monitor III unit has a high persistence factor—so it handled the interlacing formats with ease. My Zenith, on the other hand, has very short persistence. Other monitors may or may not be suitable for interlaced display. Be sure to ask your dealer if your monitor will work with Multiview before buying the system.

Some monitors may also have trouble handling Multiview's extra-wide displays. For example, both my Zenith and Apple monitors lost characters at either end of the screen when in the 132- or 160-column mode. After fiddling with the Zenith monitor's width control, I managed to shrink the image enough so all of the characters appeared on the screen. That helped, but I still noticed a significant amount of distortion around the edges of the display screen. The Apple monitor has no user-accessible width control, so I couldn't make any changes in the appearance of the display. Checkmate,

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for its part, says overscanning and distortion are common problems, especially with older monitors.

Final Thoughts

I am ambivalent about Multiview. In many respects, it's an amazing product. When used with compatible software, the card works like a dream. Used with an incompatible program, however, it's a nightmare. And, sadly, Multiview just doesn't support enough software.

If you're a dedicated user of Visicalc, Multiplan, or one of the other spreadsheets supported by the card, you'll probably wonder how you ever lived with your old 80-column card. If, on the other hand, you're only a casual spreadsheet user, or someone who routinely uses many programs during the course of a day, I'd advise you to avoid the temptation of expanded video horizons and skip Multiview.

—JOHN EDWARDS

John Edwards is a freelance writer living in New York.

Hero Jr.

The first personal robot with a built-in personality and security system

Like other personal robots of 1985—including Hubot, Maxx Steel, and Omnibot—Hero Jr. isn't truly intelligent. He can't perform such simple and practical tasks as reliably moving objects around a room or cleaning house. Essentially, he's just a rolling computer, but let's not diminish his accomplishments. We're living with the first generation of personal robots—and among them, Hero Jr. is king. He can entertain, teach, and partially justify his cost by working as a roving security system. And Hero Jr.'s built-in personality is a big step forward in personal robotics. He actually responds to the environment in limited ways, exhibiting characteristics we usually attribute only to living things.

What's Inside

Hero's circuitry includes a CMOS clock that adjusts for daylight saving time and a hundred-year calendar. He'll perform assigned tasks at preset times, "sleeping" in between. The only restriction is that the alarm mode, when used, must be the last event in a series. After waking you up, Hero Jr. reverts to one of his preprogrammed random personalities.

Hero Jr.'s charisma emanates from a Motorola 6808 microprocessor, 32K bytes of ROM, and 2K bytes of RAM, with provision for up to 16K bytes of expansion. You can increase his capabilities and even reprogram him to some extent with a variety of plug-in cartridges for games, music, education, and BASIC programming with the built-in keypad. The RS-232 interface lets you program Hero Jr. even more extensively from your personal computer.

The robot reads his environment with sound and light sensors, plus ultrasonic sonar that detects motion and measures distances from 4 inches to about 25 feet. An optional infrared (heat) sensor helps Hero Jr. seek out humans. Speech synthesis components include a Votrax SC-01 controller with four pitch levels and 64 phonemes, which enable him to say just about anything.

Two lead-acid, gelled-electrolyte batteries supply power for 4 to 6 hours; two optional cells double the operating time. A 12-volt recharger gives a full charge overnight.

On the Move

Hero Jr. looks a little like Hero 1, Heath's training robot for schools, industry, and serious hobbyists. (See *Popular Computing*, December 1983.) He's 19 inches tall, weighs roughly 25 pounds when loaded with accessories, and can carry up to 10 pounds in a tray on top of his head. He motors along—on his own or under radio control—on three wheels; the rear one controls the steering.

PHOTOGRAPH BY MIKE BLAKE

I took Hero Jr. for a walk outside. Using radio control, I sent him scurrying down a city sidewalk to greet and entertain other pedestrians. He kept hitting bumps and irregularities in the pavement and occasionally spun out of control. Later I discovered that the motor gearbox suffered serious damage. Hero Jr. kept rolling but sometimes made terrible grinding noises and burped black powder on the floor. The lesson here is that you should operate a 25-pound suspensionless machine on smooth surfaces only.

The robot has no arm and gripper mechanism. The technological sophistication of such a device would make him very expensive, and the benefits just wouldn't justify the cost—think in terms of a $10,000 feather duster and you'll understand what I mean.

Earning His Keep?

Hero Jr. comes in stripped-down form ($600) or fully assembled ($1000 with cartridge adapter and RS-232 interface; $1250 with remote control and infrared motion detector as well). You'll probably want more than the plain vanilla version. The accessories, plus the extra batteries and a good selection of cartridges, considerably increase the utility and entertainment value of the little robot.

The Guard mode helps rationalize the high cost of robotics, although I have reservations about the ultrasonic transducer in the basic model. It constantly measures distance between itself and its surroundings and interprets a change as an intruder. That's fine, but an intruder has five full seconds to identify himself before the alarm sounds—and can disable the alarm mode immediately with the clearly labeled reset switch. In addition, anyone can sneak up behind the robot and turn him off. The optional infrared sensor is highly sensitive, however, and triggers the alarm when a target begins to move.

Hero Jr. certainly has some utility as an intrusion alarm but does not live up to his full potential. I'd recommend that Heath develop a guard cartridge with sensors that respond to noise and changes in light levels. The robot could then be a powerful alarm system.

If you're handy with electronic circuits and a soldering iron, it wouldn't be difficult to add fire and smoke detectors that could trigger the robot's radio transmitter and alert the receiver to the Heath security system, another product the company offers. Heath also markets a moisture-detector kit; its sensor could be mounted on the robot's bottom, about a quarter-inch from the floor, to detect flooding. With some work and imagination, along with further developments from Heath, Hero Jr. could be eminently practical as well as entertaining.

Personality Plus

Hero Jr. has six personality modes—Speak, Gab, Poet, Sing, Play, and Explore. He speaks 18

AT A GLANCE

Hero Jr.

Manufacturer:	Heath Company, Benton Harbor, MI 49022; (616) 982-3200
Uses:	Home security and entertainment
Standard Features:	6808 microprocessor; 48K bytes of ROM; 2K bytes of RAM; two rechargeable 6-volt batteries; 17-key keypad; speaker; light sensor; sound sensor; sonar; speech synthesizer; dynamic personality
Options:	Infrared motion detector ($120); remote control ($180); RS-232 interface ($50); extra batteries ($60); cartridge adapter ($50); program cartridges ($20 to $50 each); wireless home security system ($1000)
Base List Price:	$1000 ($600 in kit form)
Reviewer's Note:	Given its limitations, Hero Jr. is a brilliant engineering accomplishment and the only commercially available robot with a built-in personality that can justify its cost by acting as a roving security system.

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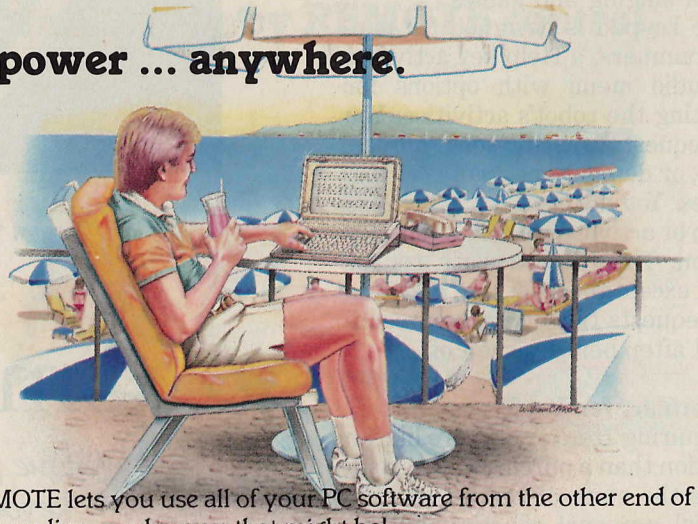

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English phrases and gabs in random phonemes. He recites nursery rhymes and sings "America the Beautiful" and "Daisy"—just like Hal in *2001*. He plays Tickle Robot and other interactive games. And he explores his environment, using his sensors to avoid obstacles and home in on humans. Hero Jr. is a unique individual. When turned on, he randomly selects one or more of his "personalities" and begins to perform. What he'll do next is always a surprise—certainly a human-like characteristic.

All this is preprogrammed at the factory, but you can easily modify the robot's behavior to suit your whims. You get his attention by using the 17-button keypad atop his head. When you press the Set-up key, Hero Jr. names each of his personalities and invites you to set a level of activity for each one between zero and 10. A zero virtually eliminates a mode, and a 10 ensures a high occurrence. It's quite simple to alter the robot's overall personality for specific occasions. During a party, for example, you'll probably want lots of singing and games.

The keypad is designed for nonprogrammers; a Help key activates an audio menu with options for directing the robot's activities. You can request a specific song, phrase, game, or demonstration of his capabilities. You also can set a wake-up alarm or activate Hero Jr.'s security system. The robot doesn't ask for much except the time, day, and year and requests this only when reactivated after being turned off.

Is Hero Jr. for You?

Acquiring Hero Jr. is more like an adoption than a purchase. He exemplifies the state of the art in commercial personal robotics—but he can't compete on a cost-benefit basis with stereos, televisions, VCRs, and personal computers. Then again, you may like being first with something truly new and delight in an electronic companion and sometime guardian. If that's the case, Hero Jr. is on the money.

Living with Hero Jr. is an entertaining adventure. In fact, the Heath personal robot has become our family pet. But like pets and small children, Hero Jr. needs supervision—you can't always predict what he'll do next. Stairways are a constant danger, and the robot's optional infrared sensor can entice it to snuggle up to a roaring fireplace, thinking it's a warm human body. Fortunately for your nerves and the furniture, Hero Jr. announces his intentions before taking a trip.

Somewhat unfairly, I must admit, when Hero Jr. says, "I think I'll explore," I hear it as "I think I'll destroy." He seems to enjoy knocking over large houseplants and has taken to wooing an expensive chess computer. Once he knocked the telephone off the hook, perhaps in a vain attempt to phone the engineers back at Heath. Not long after that he rolled into the bathroom and announced to the toilet (an object of equal height though superior utility) in no uncertain terms, "I love you."

Obviously, Hero Jr. has his limitations. The little robot is decades, perhaps centuries, behind the fictional robots we grew up with: Gort in *The Day the Earth Stood Still*, Robbie in *Forbidden Planet*, Tobor in *Captain Video*, and R2D2 and C3PO of *Star Wars* fame. Nevertheless, he's lots of fun.

—HENRY COHEN

Henry Cohen is a consumer electronics consultant and writer living in Fort Lee, New Jersey.

The Wico Smartboard

A unique programmable replacement keyboard for the IBM PC

When IBM chose not to model its personal computer keyboard after its famed Selectric typewriter, it created a market for very specialized hardware—alternative keyboards. Most of the keyboards that fill this market merely correct perceived flaws in the IBM PC's keyboard—different key placement, perhaps, or indicator lights for toggle keys.

But one of the alternatives—the Wico Smartboard—is different. It has its own 2K bytes of RAM and a built-in trackball. And you can program its function keys and trackball with often-used commands.

The Smartboard, which retails for $399.95, is plug-compatible with the IBM PC and therefore compatible with many of the IBM look-alike computers. Wico says it plans to of-

PHOTOGRAPH BY MIKE BLAKE

fer an adapter for $59.95 that will allow the keyboard to work with an Apple II Plus or IIe.

Keyboard Layout

The Smartboard's layout is similar to the layout of the IBM PC keyboard but with computer-specific keys, such as Control and Esc, moved farther away from the alphanumeric keys. This arrangement allows more convenient placement of the Shift and Caps Lock keys. Also, the Enter key is ⅜-inch closer to the semicolon key than the one on the IBM PC keyboard, placing it in easy reaching distance. As on many other replacement keyboards, the Caps Lock and Num Lock keys have indicator lights. A two-key command transforms the QWERTY layout into a Dvorak layout, but Wico does not offer alternate key labels for the Dvorak layout.

The 10 function keys are lined up along the top of the keyboard rather than grouped on the left. Wico claims this arrangement conforms more naturally to the key-labeling lines that many programs display at the bottom of the computer screen. This function key placement is generally acceptable but does not match the keyboard templates provided with many software packages written for the IBM PC. To make matters worse, the F1 through F5 keys are immediately above the corresponding number keys, which may invite errors from an unwary computer operator.

Other obvious differences include a numeric keypad that is set apart from the main keyboard cluster and a trackball on the far right of the keyboard. Above the trackball are the mode and program keys that control the keyboard's special functions.

Some aspects of the Smartboard's layout are definite improvements over the IBM PC keyboard. It's a relief to strike at the left shift key without fear of striking the backslash key or to reach for Enter without inadvertently getting the tilde key. And little touches like ridges on home keys make typing easier.

Other changes may take some getting used to—especially if you're accustomed to the standard IBM PC keyboard. While many Selectric-weaned touch-typists may prefer to have the Caps Lock key above the left shift key, that placement may frustrate an experienced computer operator who expects the Control key there.

Fortunately, the Smartboard provides a key-swap feature, and after swapping the Control and Caps Lock keys I was much happier. The key-swap function works with any two keys except the keyboard's own control keys. In fact, the feature is so effective that pressing my relocated Caps Lock key still activated the LED indicator on the true Caps Lock key.

More Than Plastic Surgery

However, there is more to the Smartboard than its cosmetic features. All 10 function keys can be programmed with any combination of keystrokes—while still retaining the functions of those keys set by an application program. The Mode Select key lets you choose the functions you programmed, and an LED lets you know when that mode is active.

To program the function keys, all you do is press the special program key, enter the command sequence you want to store, then press the desired function key. A single function key can store up to 126 characters, but you cannot use more than a total of 252 characters for programming all of the function keys. Although the programmable feature is useful, it cannot replace spreadsheet macros used to execute lengthy commands or handle boilerplate paragraphs in word-processing programs.

You can also program the trackball, which can store a key sequence for each vertical and horizontal direction for both of the trackball's modes. Then, to initiate a programmed sequence, you simply move the trackball in the appropriate direction. However, each trackball command can be no more than eight keystrokes long.

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the cursor, setting it at any of 10 different sensitivities for faster or slower cursor movement, and you can select cursor movement in either four or eight directions, including diagonal.

Three AA batteries keep your programming and other settings in the keyboard's memory when the computer is turned off. An optional software utility ($10) lets you configure the keyboard differently for each program you use, and it stores those configurations on a disk.

The on-board memory also provides a 128-character type-ahead buffer, which lets you continue entering data even while the computer is busy. Of course, there's a built-in hazard: should you inadvertently strike the wrong keys while the computer is busy recalculating the spreadsheet you're working on, for example, you could easily erase or change a complicated cell formula. Fortunately, however, the buffer can be turned off—an ability the IBM PC keyboard lacks.

Other features include an electronic key click and repeating keys, both of which can be disabled, and a reset key that replaces the Ctrl-Alt-Del command used by the IBM PC. As a fail-safe measure, you must hit the reset key twice in quick succession to engage that function. The method saves only one keystroke, but it offers single-handed operation.

There's also a BASIC mode, similar to the one in the IBM PC's BASIC editor, that automatically engages the Caps Lock key and causes shifted letter keys to produce BASIC commands.

Is It a Gimmick?

Using a trackball for cursor control is a good idea for the most part. The trackball responds quickly, is as easy to control as a mouse, and requires no additional desk space.

There are drawbacks, though. It's difficult to obtain both accuracy and high speed. If you give the ball a good roll, chances are the cursor will overshoot the spot you were trying to reach. Also, if you have programmed the trackball and accidentally brush your hand against it, you may trigger undesirable commands.

The remaining keyboard features are definite assets. Fast typists using an IBM PC will welcome a keyboard buffer six times larger than the one on the IBM PC. And with a keyboard that lets you swap keys, there is little left to complain about.

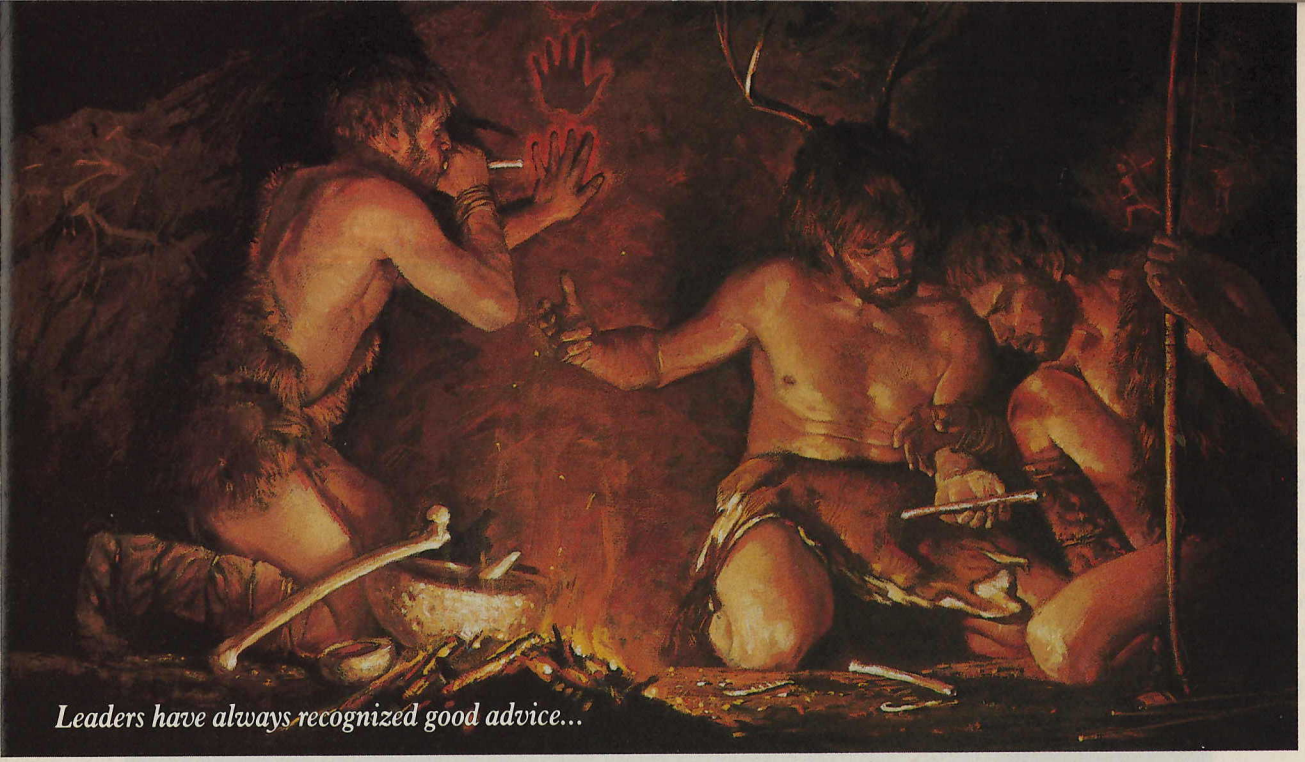
Because Wico doesn't supply alternate key labels with its Smartboard, you must remember which of the programmable keys contain which commands. But stick-on labels (available at any office supply store) and the optional utility software minimize that problem. Indeed, the Smartline is a well-built, well-planned keyboard that could greatly increase your efficiency at the computer. —TAN A. SUMMERS

AT A GLANCE

The Wico Smartboard

Manufacturer:	Wico Corporation, 6400 West Gross Point Rd., Niles, IL 60648; (312) 647-7500
Uses:	Programmable replacement keyboard for the IBM PC
Standard Features:	Plug-compatible with IBM PC; 88 keys; 10 programmable function keys; programmable trackball; indicator LEDs on toggle keys; 128-character type-ahead buffer; 2K-byte nonvolatile RAM; key-swap function; selectable Dvorak mode; electronic key click; repeating keys
Base List Price:	$399.95
Options:	Utility software ($10 with warranty card, otherwise $15); adapter for Apple II Plus and IIe (release date not set at press time, tentative price $59.95)
Reviewer's Note:	A well-integrated, sturdy keyboard that should make computing more efficient. The keys are responsive and have a solid feel. The lack of key labels, however, makes this a one-person tool.

Tan A. Summers, who lives in New Orleans, Louisiana, is coauthor of *1,001 Things You Can Do with Your IBM PC.*



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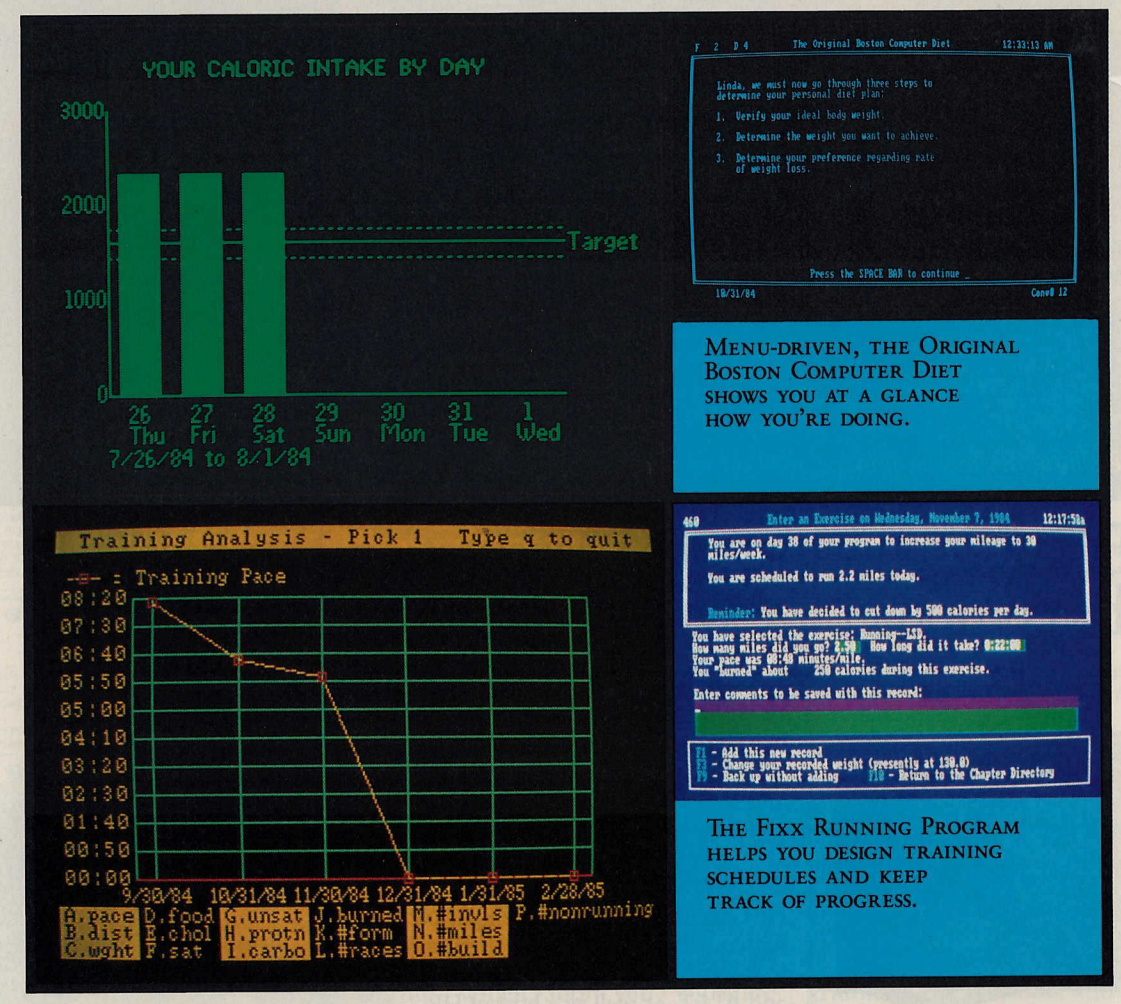
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1000
0
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26 Thu
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7/26/84 to 8/1/84
The Original Boston Computer Diet
12:33:13 AM
Linda, we must now go through three steps to determine your personal diet plan:
1. Verify your ideal body weight.
2. Determine the weight you want to achieve.
3. Determine your preference regarding rate of weight loss.
Press the SPACE BAR to continue
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Training Analysis - Pick 1 Type q to quit
: Training Pace
08:20
07:30
06:40
05:50
05:00
04:10
03:20
02:30
01:40
00:50
00:00
9/30/84 10/31/84 11/30/84 12/31/84 1/31/85 2/28/85
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M.#invls N.#miles O.#build
P.#nonrunning
Enter an Exercise on Wednesday, November 7, 1984
12:17:58a
You are on day 38 of your program to increase your mileage to 30 miles/week.
You are scheduled to run 2.2 miles today.
Reminder: You have decided to cut down by 500 calories per day.
You have selected the exercise: Running--LSD.
How many miles did you go? 2.50 How long did it take? 0:22:00
Your pace was 08:48 minutes/mile.
You "burned" about 250 calories during this exercise.
Enter comments to be saved with this record:
- Add this new record
- Change your recorded weight (presently at 138.0)
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THE FIXX RUNNING PROGRAM HELPS YOU DESIGN TRAINING SCHEDULES AND KEEP TRACK OF PROGRESS.

The Original Boston Computer Diet and the Fixx Running Program

They don't promise miracles, but this electronic nutrition counselor and exercise coach can help you keep in shape

Weight control is by far the most lucrative sector of the self-improvement industry. It's also the most disreputable. The average physician despises "diet doctors" for everything except their income. Diet books are favorites of publishers and bookstores—most are nonsense. Computer diets are in their infancy, but there's no reason to suppose they'll be an improvement.

Perhaps I'm being too cynical—at least on the subject of computer-assisted weight control. The Boston Computer Diet is sensible, accurate, and mostly free of silliness. But it shares the major weakness of diet aids in general—it can't force you to do what you don't want to do. To be successful you must make a commitment.

The package includes 97 pages of educational information and pep talks, a 50-page instruction booklet for reporting data and planning meals, and a master disk and a "daily" disk. Both are copy-protected with no provision for even one backup. (For more than one person to use the same program, you must purchase additional daily disks at a nominal fee.) The company will replace a damaged disk free during the first 30 days. Afterwards it's $5.

The Boston Computer Diet's designers have cleverly programmed three personalities into the program to serve as your "counselors." After booting you must choose among Amy, who's sweet and sympathetic; George, stern, no nonsense; and Shirley, breezy and free-wheeling. I picked George.

Customizing on Cue

The program tailors a diet for you, which means that at the outset you must spend about 15 minutes answering a series of questions. A medical history comes first. Did I have heart disease, high blood pressure, high cholesterol, gout, and so on? It sounds terribly scientific, but except for urging you to see a doctor, the program does little with positive answers.

On one question I lied. Asked for my weight, I added 50 pounds. There was no choice; I'm not fat. This points out a weakness common to all self-improvement software: you can cheat and no one will know. The problem, of course, is that you're just hurting yourself.

Fortunately, my eating habits are chaotic enough to make me a good guinea pig for the program. A dozen more questions revealed that my diet is probably nutritionally adequate but my eating habits are irregular. I flunked the test on "frequency and timing." I eat a late breakfast, skip lunch, and snack constantly.

The final quiz covered "behaviors, feelings, and situations that trigger overeating." It was obvious that George disapproved when I admitted that I rarely eat at the dinner table but in my den next to my computer. Another "bad" habit of mine is that I almost always read while eating. In fact, I can't sit down with a book without something to munch on—and I stop munching when I'm tired of reading, not vice versa. If there were any justice, I'd be fat.

Finally, the program asked how fast I wanted to lose. Two pounds a week is reasonable. The program agreed and calculated a goal of 1650 calories a day. After the quiz, George assigned a chapter in the manual, preceded by a stern reminder that the readings are an important part of the program. Did I intend to comply? Y/N . . . I pressed Y. "Terrific," he responded.

AT A GLANCE

The Original Boston Computer Diet

Manufacturer
Scarborough Systems
55 South Broadway
Tarrytown, NY 10591
(800) 882-8222

Price and Hardware Requirements
$79.95; Apple II Plus, IIe, and IIc, and IBM PC, XT, PCjr (128K), second disk drive and graphics card optional; $49.95, Commodore 64

Audience
People with weight loss problems of 10 to 40 pounds

Reviewer's Note
This program is sensible, accurate, and mostly free of silliness.

The chapter was a pep talk containing the three statements obligatory in all diet literature: obesity is a terrible thing; other diets are gimmicky, unscientific, tedious, and unhealthy and they don't work; and this diet is the opposite.

At the beginning of the second session, George analyzed my responses. He complimented me on a low consumption of sweets, salt, and alcohol and good intake of dairy products and grains but disapproved of my missing meals. As hunger increases, he warned, you become vulnerable to overindulgence. "You seem to be a nibbler," he admonished. "It's time to establish a consistent meal pattern." That's good advice.

Boston dieters are expected to concentrate as they eat and report to the computer at least once a day, giving date, hour, mood, item, and portion size of every food encounter.

The Computer Diet's reporting system is easy to master. With a few keystrokes you can enter the meal, time, mood (from a choice of 10), and food. The program contains an easy-to-call database of 700 foods and their calories. Entering "oatmeal" displays all items under that name. To save keystrokes, you can enter "oat" to display everything beginning with those letters. Naturally each food in the database has a fixed portion size, but hitting the plus and minus keys changes portions accordingly by small amounts and recalculates the calories—a big convenience. It's also easy to add foods to the database.

Feedback

Once you've entered the day's meals, you can look at a summary of the week's meals and your counselor's critique. George sounded depressed when I exceeded my goal, cheered when I made it, and followed with encouraging homilies. Detecting a persistent problem (in my case, snacking), he might deliver a quick lecture on overcoming it. Each daily session ended with a reading assignment.

Short and pithy, each reading covers a nutritional or psychological aspect of dieting ("Carbohydrates Aren't All Bad," "20 Ways to Underreport Your Food Intake," "Burning Calories For Fun and Profit"). All are chatty, full of exhortations and warning examples. They're also a good source of facts on nutrition and human physiology.

If you choose, the program will plan meals up to a week ahead. Each appears on the screen for that date, complete with portions and calories. As an added convenience, a few keystrokes give you a shopping list based on the plan. Don't expect a gourmet experience. Boston's meals are sensible and dull, but it's easy to substitute. Your counselor will not complain as long as you match calories.

The daily disk stores full details on a week's meals but keeps caloric and nutritional content for up to a year's worth of eating. With a graphics adapter you can view or print bar and line graphs showing your prog-

ress. You can also print reports, shopping lists, meal plans, or the day's dialogue. If you enjoy recording the minuscule details of daily activities, this program is for you.

Except for a quiz and a few readings, Boston pays little attention to exercise. This is not a criticism, since this is a diet program, but don't expect to lose a significant amount of weight without regular exercise.

A Sensible Approach

Stripping away the high-tech hoopla, the Boston Computer Diet is straightforward. You eat less, report your daily activities, and try to stick to your new regimen. The authors boast that everyone who follows it will lose weight. They're right, but any veteran dieter knows the irrelevance of that statement.

As a physician, I find no fault with the authors' approach. The diet is sensible, nutritional, and flexible. Their motivating technique involves behavior modification. You must analyze your eating behavior, pinpoint each bad habit, adopt a strategy to overcome it, then closely monitor your efforts. This rigidly authoritarian approach is probably the best way to change an unhealthy habit.

I've found that diet programs are not an important help in dieting in the long haul. They provide advice and encouragement (just as I and other doctors and support groups do), but neither is strictly necessary.

Dieting is long, tedious work. Faced with the torment of not eating, too many overweight people search for the right doctor or right program. Once found, they hope the pounds will melt off with a modest, but not unreasonable effort. Authors and diet doctors make their fortunes from this search.

To succeed in dieting you must first make a profound internal decision. No book, computer program, or individual can make you decide to lose weight. Whether or not you accept this, you'll find the Boston Computer Diet a good educational experience, a useful reference, and an amusing companion.

—MICHAEL OPPENHEIM

Michael Oppenheim is a physician and freelance writer living in Los Angeles.

James F. Fixx Running Program

Joan Benoit's historic Olympic marathon first-place finish last summer didn't come easy. That memorable moment was the result of the kind of grit, determination, and self-motivation that all runners strive for but few achieve.

Running, and especially winning, requires a lot of hard work. Most people could use some help and guidance. In the absence of real coaches, runners might consider turning to an electronic version of the same for assistance in designing and maintaining a training program.

The James F. Fixx Running Program is designed to assist amateur runners in setting and achieving goals. It can help you plan, chart, and monitor a training program.

Although designed primarily for runners, this program can also be used by health-conscious souls who are interested in the minute details of their nutritional well-being or who want to keep precise records of their sports activities. More than one person can use a single copy of the program by creating individual data disks.

The Fixx program was set for release last summer, but marketing plans were halted at the death of Jim Fixx. With the support of Fixx's family, MECA decided to go ahead with its plans for the program.

The Running Program uses extensive on-screen menus, background text, and help messages, virtually eliminating the need for you to spend hours reading a manual before you can get going. But while the menus and help screens are all you need to actually use the program, the background reading on sports fitness is too brief to be of much help. Outside reading is recommended, especially for new sports enthusiasts.

The real value of the Running Program lies in the interactive manner in which it works with you in creating a training program, maintaining detailed exercise and performance records, and monitoring weight and dietary data. You could take care of these details in hand-kept paper logs, but managing all the minutiae with the help of a microprocessor and floppy disks is far superior.

Leaving all the calculating—times, distances, and calories consumed and expended—to the computer frees you to concentrate on the real work of running.

The Groundwork

Like any good coach, the Running Program evaluates your current fitness level before advising a training regimen. Getting routine details out of the way, it first asks you to enter your age, sex, height, weight, and frame size. From this information, the program comes up with an ideal weight, which it later uses to help you determine what you need to eat to be at your optimum physical performance level.

To further assess your overall fitness, the program guides you through the Harvard Step Test and a timed 2-mile run/walk. The Harvard Step Test, which measures cardiovascular recovery rate, consists of stepping up and down repeatedly on a single step for 4 minutes and taking your pulse after 1, 2, and 3 minutes of rest. With the pulse readings, the program can tell you if your recovery rate is excellent, good, fair, or poor. If the test shows that you have a poor recovery rate, the Running Program advises you to see a doctor.

The 2-mile run/walk test is to determine how long it takes you to cover two miles. Again, the program tells you how you fared—excellent, poor, or somewhere in between.

Your next step is to pick a training goal. The program comes with four ready-made models into which you plug your own information about distance and time goals. You can choose a training schedule that will help you work your way up to running 3 continuous miles, increasing your weekly mileage by some amount you determine, or achieving a self-imposed

time goal for a 10-kilometer race or a marathon (26.2 miles).

In addition to following or modifying the ready-made models, you can fashion your own schedule. This allows runners who are knowledgeable about training techniques to use the program's electronic logs for easy bookkeeping. Getting a printed copy of schedules is as easy as hitting one key. And a graphics feature gives you a visual interpretation of your facts and figures.

If you're new at the running game and just want to be able to keep your legs moving at a good clip for 3 miles, the program uses your 2-mile run/walk time as a base and sets up a training program of running and walking that ends when you can complete 3 miles without walking.

Runners who aren't gearing up to beat the pants off everyone in a race but just want to increase their weekly mileage can use the program to help them figure out how much faster and farther they need to run each day to reach their target. Although the software advises you to increase your mileage by 10 percent over a 4-week period, it can handle more or less ambitious goals.

The Training Program

To set up such a training program, you enter a day-to-day breakdown of your workouts along with your weekly mileage goal and the number of weeks you want to train. The program then generates a schedule that follows your routine as closely as possible, spreading the extra distance evenly throughout the entire time period.

For the hearty souls who are gearing up for a 10-kilometer run or a marathon, the Running Program is more demanding. Long runs and speed workouts are the name of this game. The program's speed workouts consist of between 6 and 20 timed sprints around a 440-yard track with one-lap jogs as a rest between sprints. These workouts and weekend runs of 10 to 16 miles are required training for would-be 10K-runners.

While first-time marathoners without a fast time goal are not asked to do speed workouts, they are encouraged to do several runs of more than 20 miles, including one of 26 miles. For marathoners with a time goal of a maximum of 3 hours, the training program is more rigorous. In addition to making long runs up to full marathon distance, these runners also are expected to do mile-long speed workouts rather than the quarter-mile sprints suggested for 10-kilometer runners.

Creating the schedule is nothing compared to actually living it. And disciplining yourself to enter information into the computer on a regular basis is a piece of cake compared to that required to pound the track in quest of those higher goals.

AT A GLANCE

The Running Program

Manufacturer
Micro Education Corporation of America
285 Riverside Ave.
Westport, CT 06880
(203) 222-1000

Price and Hardware Requirements
$79.95; IBM PC, XT, AT, PCjr (with 256K), and compatibles

Audience
Amateur runners who could use some guidance from an electronic coach

Reviewer's Note
This program helps you set a goal and stay on course.

Easy to Use

The program makes maximum use of menus and windows for easy maintenance of exercise records. Some entries are accomplished by pointing to an on-screen choice and hitting a key to select that choice. Alternately, you type information in response to on-screen prompts. For example, if you run a daily workout of five miles at a fairly slow pace, you can record that by pointing the cursor at "Running—long slow distance," and hitting the F1 key. The program responds by asking you how far you ran and how long it took. After you supply the distance and time, the program tells you how many calories you burned and then displays a larger window for you to record any comments you have about that workout. The information then becomes part of your permanent log.

The log, as mentioned earlier, has provisions for you to record—but not incorporate into your training schedule—other types of exercises. Swimmers can highlight that option in the menu, hit a function key, and enter the distance. Again, the program immediately shows the number of calories burned and then stores the exercise record with the rest of your log. Other sports listed in the menu include cycling, basketball, handball, and racquetball.

In keeping with any sound fitness program, the Running Program suggests you pay close attention to your diet. Although it won't put you on a weight-reducing plan the way it sets up an exercise training schedule, the program does allow you to easily and thoroughly monitor your food intake.

With the personal information you gave the program when you created your exercise log, it estimates the number of calories you should consume to maintain your present weight. If that is not your optimum weight, the program tells you what affect your new training schedule will have on your weight at that level of caloric intake and also determines the number of calories by which you'd have to reduce your food intake to achieve your desired weight.

Just as you keep the exercise logs, you also build and maintain nutritional logs. Using the food menus, you point to what you've eaten during the day and the program calculates daily totals of calories, grams of protein, fat, carbohydrates, and serum cholesterol level. As the weeks pass, the program gives you a record of how your exercise and diet have affected your weight.

The Test

The Running Program claims to be able to predict race performance at any distance. Using actual finish times from races and hard training runs in distances from 5 to 26 miles, I found that the program did fine, predicting within 4 minutes my marathon time. But it had trouble with distances of fewer than 5 miles. When asked to predict how fast I could run a mile, it said I could finish in 3 minutes and 55 seconds—that's only 8 seconds slower than the world record and hardly a time I could call my own.

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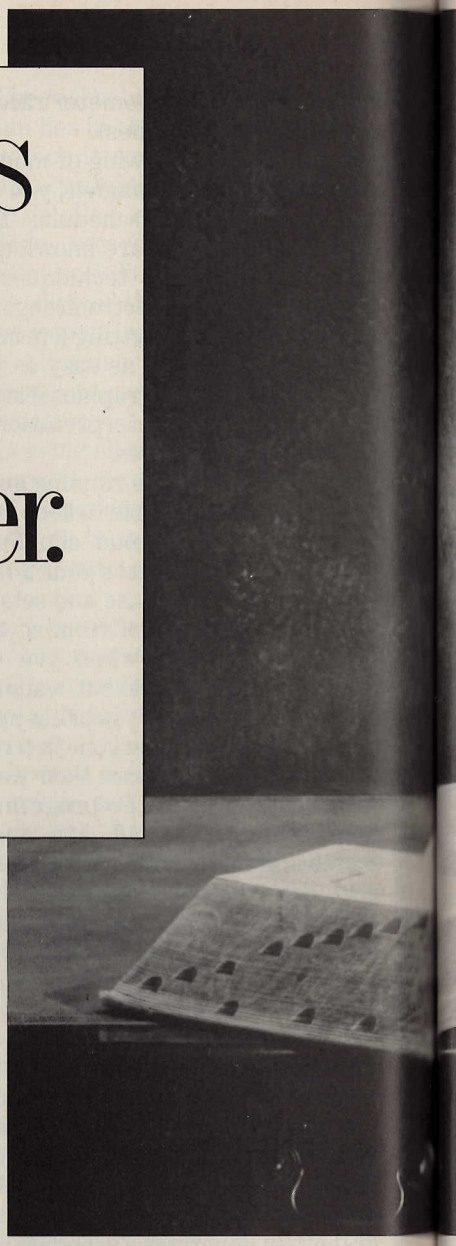

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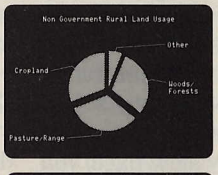

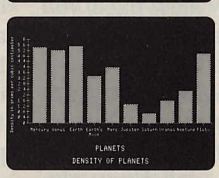

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- *1 year warranty*

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The problem is that the program uses a straight line graph to plot the data. This, it's now becoming obvious to both program users and designers, renders invalid race time predictions at the very low end of the scale. MECA is currently considering ways it might address the problem in the next version of the program, which was scheduled for release at the time of this writing. (The updated version contains no new features, only corrections to known bugs. Registered owners get a free upgrade.)

My main criticism of this program involves the 10K training schedule. As it is, the program has anyone in this class doing speed workouts no matter how modest the goal. It has all 10K hopefuls doing heavy, anaerobic, oxygen-debt workouts every week. This is overtraining for someone who wants to finish a 10K run in about 45 minutes. Anyone who is shooting for a time slower than that may very well quit running after the first try at a speed workout.

The program would be more versatile if it allowed those interested in the intermediate distance to modify the training program. Intermediate runners using the program might consider substituting a long slow run of 6 to 8 miles or a faster run of about 5 miles if the speed work is too grueling.

Who Will Profit Most?

The Running Program is designed for runners of all abilities from those whose modest goal is being able to run for 3 consecutive miles to those who have their eyes on the big 26.2. But practically, it's the runners of intermediate abilities who'll probably make the most of the program. Less ambitious runners may not spend the time required to enter data and ponder endlessly the metabolic activities of their bodies; more serious runners may already be beyond the scope of the program.

The James F. Fixx Running Program brings to coachless runners a structured training environment and a simple format for keeping track of progress. All you have to do is put in the leg work. —TOM EASLEY

Tom Easley is the supervisor of Development Projects at the *New England Journal of Medicine* and has twice run the New York Marathon.

BUSINESS GRAPHICS

Overhead Express

Bypassing graphics services vendors, this program gives you the tools to create your own presentations

Creating an attractive presentation for use with an overhead projector requires expertise and equipment generally available only through outside vendors. Using these services is expensive, and the quality is unpredictable. Phototypesetters, color separators, and other providers of graphics services exact a hefty fee. As well, they have been known on occasion to bring furrows to the brows of business people who are expected to give clear, beautiful presentations on time.

If you want to leave some of these troublemakers by the wayside and gain more control over the way your presentations turn out and when they're finished, just hop aboard the Overhead Express. Designed to produce high-quality visuals for overhead projection or on-screen use in a few minutes and at a fraction of their usual production cost, Overhead Express is a welcome addition to the world of business graphics software.

Its wide variety of features for displaying text and graphics give you freedom to create all sorts of presentations. Choosing from among Overhead Express's typefaces and graphic tools, you design your own presentations on-screen, print them, and either photograph them with slide film or have them copied on acetate.

With Overhead Express, you may not completely eliminate the need to rely on outside services—you may have to have your film developed or visit a copy center to obtain acetate transparencies—but you will gain control over much of the process of designing and creating a variety of visual presentations.

Overhead Express includes four typefaces (Modern, Classic, Script, and Popular); international characters; a special graphics font; 12 ready-made overhead templates; text enhancements such as shading, boxes, borders, and underlining; two text-insertion modes; and ways to preview work-in-progress and generate on-screen shows.

Entirely menu-driven, Overhead Express is easy to use. In line with many new programs, it lets you either enter commands directly or work through the appropriate menu. Its contextual help screens and great flexibility make the program easily accessible. It is a good idea, however, to keep the 221-page manual or 14-page quick reference handy; both contain actual-size representations of the typefaces and graphic symbols available, and both list the numerous editing and formatting commands necessary to make full use of the program's Custom Editor.

The main menu gives you three options: Prepare, Check, and Produce Presentation. With the first, you enter your data using either the Express or Custom Editor. The second menu option lets you preview your designs before you print them, and the last option puts your creations on paper.

The Express Editor

The Express Editor provides 12 commonly used templates: Budget, Bullet, Compare, Grid, List, Notes, Outline, Prose, Table, Title, Window, and three-column. Although they

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are pictured in the manual, you can also get a rough sketch of each template by pressing the F1 key for help when the template choices appear at the bottom of the screen. Since format and font selection are already taken care of when you select one of these templates, all you do is enter your data and the program does the rest.

If these standard formats don't exactly fit your needs, you can modify them from within the Express Editor. Working your way through the menus using one of several methods, you choose the option for customizing a template. This calls to the screen a list of the 12 templates.

For illustration purposes, let's say you want to modify the Bullet template because your information calls for five bulleted items instead of the four in the predefined form. You want to, for example, create an overhead transparency that lists the five suggestions you've received for the location of an upcoming conference you're planning. You type "Conference Location" on the title line and "Suggestions Received" on the subtitle line. To create the fifth bulleted item, you position the cursor on one of the Bullet Item lines, hit a function key (F4), highlight "Copy this section," and press Return. Type in the five locations and you're done.

At any point during the process of customizing templates, you can view a sketch of your work by pressing the Preview function key. Text appears as solid blocks to give you a sense of the overall layout and appearance.

When you are through entering text, press the Escape key to save your file and return to the Main Menu, where you can use the second option to check your presentation. This is a worthwhile step to take before printing your work because it allows you to see the presentation just as it will appear on paper (though reduced in size), have the program check for errors, or print a list of the formatting commands used. It works beautifully, though a bit slowly.

The Custom Editor

Most Overhead Express users will spend the bulk of their time in the Express Editor. It's quick and easy, and the 12 ready-made templates will almost certainly meet most presentation requirements. Should a presentation require substantial modification or if it is intended for on-screen display and will include special timing and lighting effects, then you'll have to use the Custom Editor.

The Custom Editor lets you alter the spacing between lines of text, center a block of text between margins without changing the alignment of its component lines, define box and rule values (that is, the thickness of horizontal and vertical lines and distance above and below text), move a line of text up or down a specific distance, justify margins, control screen scrolling, insert pauses between screen pages, and use reverse screen lighting.

Although the Custom Editor gives you complete freedom in designing screens and presentations, there's a price to be paid for the versatility. Skillful operation requires a great deal of practice, perhaps too much for those unlikely to use the program on a regular basis. Compared to what it costs to have outside professionals do the work, however, such an apprenticeship may prove a worthwhile investment.

When it comes to text entry and manipulation, Overhead Express has many of the features you'd find in a fairly sophisticated word processor. The insert key toggles between the overwrite and insert modes; deletions can be made by character, line, from the cursor to the beginning or the end of the line, or by page. You can put a line into memory and recall it. The arrow keys move the cursor one character or line at a time, Crtl-PgDn/Up moves forward and backward one full screen, and Pg/Dn/Up moves to the next or previous file page. It's all very logical and easy to remember.

To produce your presentation, you highlight either Printer or Screen from the Main Menu. If you choose the latter, your presentation will scroll up on the screen, pause, and repeat over and over. This feature is useful for conventions or window displays where a message is to be displayed continuously. Choosing printer, of course, produces a hard copy of your file.

While the hard copy produced is, as you'd expect, of lesser quality than that obtainable from a phototypesetter, it should nevertheless be adequate for most presentations.

Documentation

Overhead Express's documentation is excellent. As indicated earlier, the package comes with a lengthy instruction manual and a shorter pamphlet containing the commands and illustrations of the available fonts, templates, and graphic symbols. The manual includes eight tutorial exercises and a helpful section on preparing screen shows. All are well paced, clearly illustrated, and easy to follow.

An Enhancements section outlines the steps required to create your own templates or modify those that come with the program. The five pages devoted to "Tips on Improving Visuals" should be required reading for anyone who has to prepare any kind of screen presentation. The section includes guidelines for the maximum number

AT A GLANCE

Overhead Express

Manufacturer
Business and Professional Software
143 Binney St.
Cambridge, MA 02142
(617) 491-3377

Price and Hardware Requirements
$195; AT&T PC 6300, Data General One, DEC Rainbow 100, Decmate II, IBM PC, XT, AT, and compatibles, TI Professional and Prolite; requires 192K bytes of user memory; graphics card recommended for on-screen display and previews; supports the following printers: AT&T 473, Data General One, HP Thinkjet in Epson mode, LA100 and LA150, Epson MX-80, FX-80, MX-100, FX-100; IBM Graphics Printer; C Itoh 8510 (or Prowriter), 1550 (or Prowriter II), NEC PC-8023A-C; Okidata Microline 84 Step 2

Audience
Businesses and individuals desiring rapid and low-cost production of graphics materials for overhead transparencies and on-screen display

Reviewer's Note
This program puts you in control of the quality and production schedule of your presentations.

of words that can effectively be displayed on a line or page, how to determine whether a chart will be more appropriate as an overhead or handout, and other techniques generally known only to audiovisual professionals.

The program's on-screen documentation is also well done. Whenever you press the F1 (Help) key, Overhead Express supplies information relevant to where you are in the program. Such context-sensitive help liberates you from the tiresome task of rummaging through a large body of material every time you need assistance.

A Bit Slow

My main criticism of Overhead Express concerns its speed of operation. The program returns to disk quite often and spends a long time there. Retrieving a file from disk activates the automatic backup feature, and there is no way around it (about 30 seconds of whirring).

If you make any changes while in the Editor, you must save the file upon exiting, which takes about 5 to 10 seconds. It's a good idea to review your presentation on the screen before sending it to the printer (20 to 25 seconds); if you don't like the way it looks, you must return to the Editor, create another backup (another 25 to 30 seconds), make the necessary changes, and exit and save again (5 to 10 seconds). Sending the file to the printer fires up the drives once more (20 to 25 seconds), and they spin again when printing is complete (20 to 25 seconds).

While it is true that a file can be printed with fewer steps, the sequence described above is typical of the pattern likely to occur during actual use. In fact, it should be considered the bare minimum. Trial and error is the only sure route to high-quality overhead transparencies, and a certain amount of tinkering with the different fonts, formats, and graphic devices is therefore inevitable.

Overhead Express will probably exceed the requirements of those charged with creating graphics and textual presentations. While the quality of the printouts is not as sharp as that produced by typeset-

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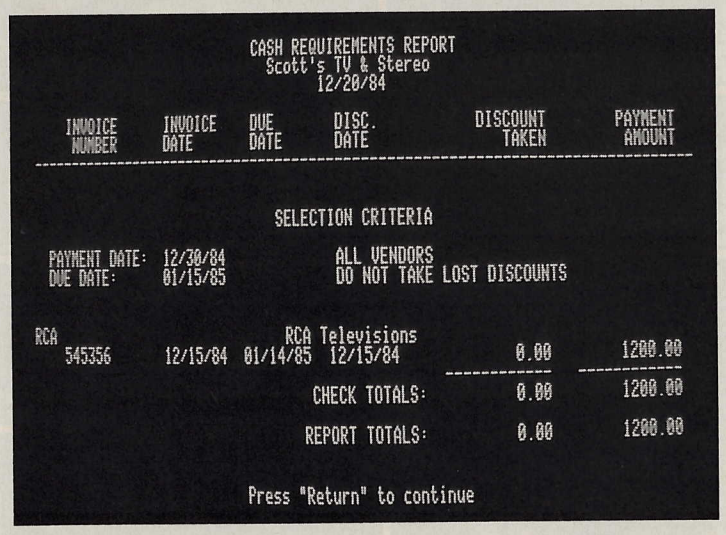
ting equipment, the program has other features to recommend it. Its menu structure and ready-made templates make it easy to use; its Express and Custom editors give you design flexibility; and the fact that the whole show is under your control will save you from worrying about whether those overhead transparencies will be finished in time for that major presentation. Additionally, the program has the ability to create automated screen shows. Overhead Express is sure to find a place in the world of business graphics. —WAYNE J. SASSANO

Wayne J. Sassano is a Connecticut-based communications consultant.

BUSINESS



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                CASH REQUIREMENTS REPORT
                  Scott's TV & Stereo
                        12/20/84

 INVOICE    INVOICE   DUE      DISC.          DISCOUNT      PAYMENT
 NUMBER     DATE      DATE     DATE            TAKEN        AMOUNT
-------------------------------------------------------------------

                    SELECTION CRITERIA

 PAYMENT DATE:  12/30/84          ALL VENDORS
 DUE DATE:      01/15/85          DO NOT TAKE LOST DISCOUNTS

 RCA                              RCA Televisions
    545356      12/15/84 01/14/85 12/15/84        0.00        1200.00
                                                 ------      -------
                                 CHECK TOTALS:    0.00        1200.00

                                 REPORT TOTALS:   0.00        1200.00

                  Press "Return" to continue
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Back to Basics Accounting

Peachtree's accrual system is a real asset for small businesses

Back to Basics is not quite what its name suggests. Although containing no more than the standard trio that forms the heart of most business accounting systems—the general ledger, accounts receivable, and accounts payable—this is a sophisticated package.

Well deserving of its place among top-selling business software, Back to Basics is an accrual-based accounting system, which means that assets, liabilities, revenues, and expenses are added to or subtracted from your business even if you haven't actually taken in or paid out cash. Accrual accounting is, for the most part, the standard method for businesses of the size this program addresses—those with sales between $1 and $5 million and assets up to $21 million.

Operating quickly, smoothly, and logically, this menu-driven program can maintain detailed financial records, keep day-to-day track of a company's performance, forecast cash needs to pay suppliers and vendors, and monitor customers' accounts to help make sure they stay current.

The three modules are integrated to the extent that you can read into the general ledger data from both the accounts receivable and the accounts payable modules.

If you already have a working accrual-accounting system, Back to Basics makes it fairly easy to go electronic. If you plan to use the program to set up an accrual system from the bottom up, you're in for quite a job. The program works fine; it's the task that's onerous.

You get help from the tutorial, which walks you through a simulation of the entire process step by step. The well-organized and clearly written manual also helps you get going and stay on track. The Roadmap, a six-panel foldout, describes the program's structure, showing the relationships among various modules, tasks, menus, and submenus. And a lucid 66-page overview of general accounting principles, written by Robert N. Anthony, accounting teacher, textbook author, and a former Defense Department controller, helps the uninitiated.

It's hard to see how Back to Basics couldn't handle the accounting chores for all but the most complex of small businesses. Compare your needs to these figures: the IBM version (which is the one I used for this review) can handle 254 categories, covering the business's assets, liabilities, expenses, and earnings. In addition, it can store 4500 general ledger entires (an entry being one debit and one credit) per month, process 1500 checks, handle 2100 invoices per month in accounts receivable, keep track of 750 customers and 700 vendors, and handle 1500 invoices in accounts payable.

In comparison, the Apple version can handle 1700 general ledger entries, 300 customers, and 300 vendors; the Commodore version can handle 1850 entries, 300 customers, and 300 vendors; the Atari version can handle 850 entries, 175 customers, and 200 vendors. The IBM PCjr version has the same capacities as the PC version. And the Macintosh version, which was still in production at the time of this writing, was planned to handle entries comparable in number to that of the IBM version. Maximum quantities of other features and functions are adjusted accordingly. While the IBM and Mac versions are sold as a group only, the versions for the other com-

puters are sold in separate modules.

The start-up procedures allow you to select a beginning period start-up date, customize portions of the program, and select a password to protect against unauthorized entry.

Once you complete the start-up sequence, you can't change certain things, including the month and year you begin entering transactions. You can make other types of modifications within each of the modules, however. In the General Ledger you can add, modify, or delete an account name and value at any time.

The General Ledger has built-in a Standard Chart of Accounts, containing 75 categories, so you don't have to spend an inordinate amount of time creating accounts. And you can change those and add new ones.

AT A GLANCE

Peachtree Back to Basics Accounting System

Manufacturer

Management Science America Inc.
3445 Peachtree Rd., NE
Atlanta, GA 30326
(800) 554-8900
(404) 239-3165 for accounting software customer support

Price and Hardware Requirements

$395; IBM PC and compatibles and Macintosh; $95 per module or $195 for all three modules sold together for Ataris, Apples, Commodore 64, and IBM PCjr

Audience

Small businesses that need to keep detailed accounting records using the accrual system

Reviewer's Note

Back to Basics gives you good value for the money.

General Ledger

The General Ledger has a number of useful features beyond the basics. It lets you do a Cash Sales Journal, tracking cash in and out of your business's cash register each day and showing shortages and overages. It also provides for recurring journal entries. If you have a monthly rent payment of $1000, you can instruct the program to automatically enter that transaction every month. And, in the way of heading off errors before they occur, the program in-

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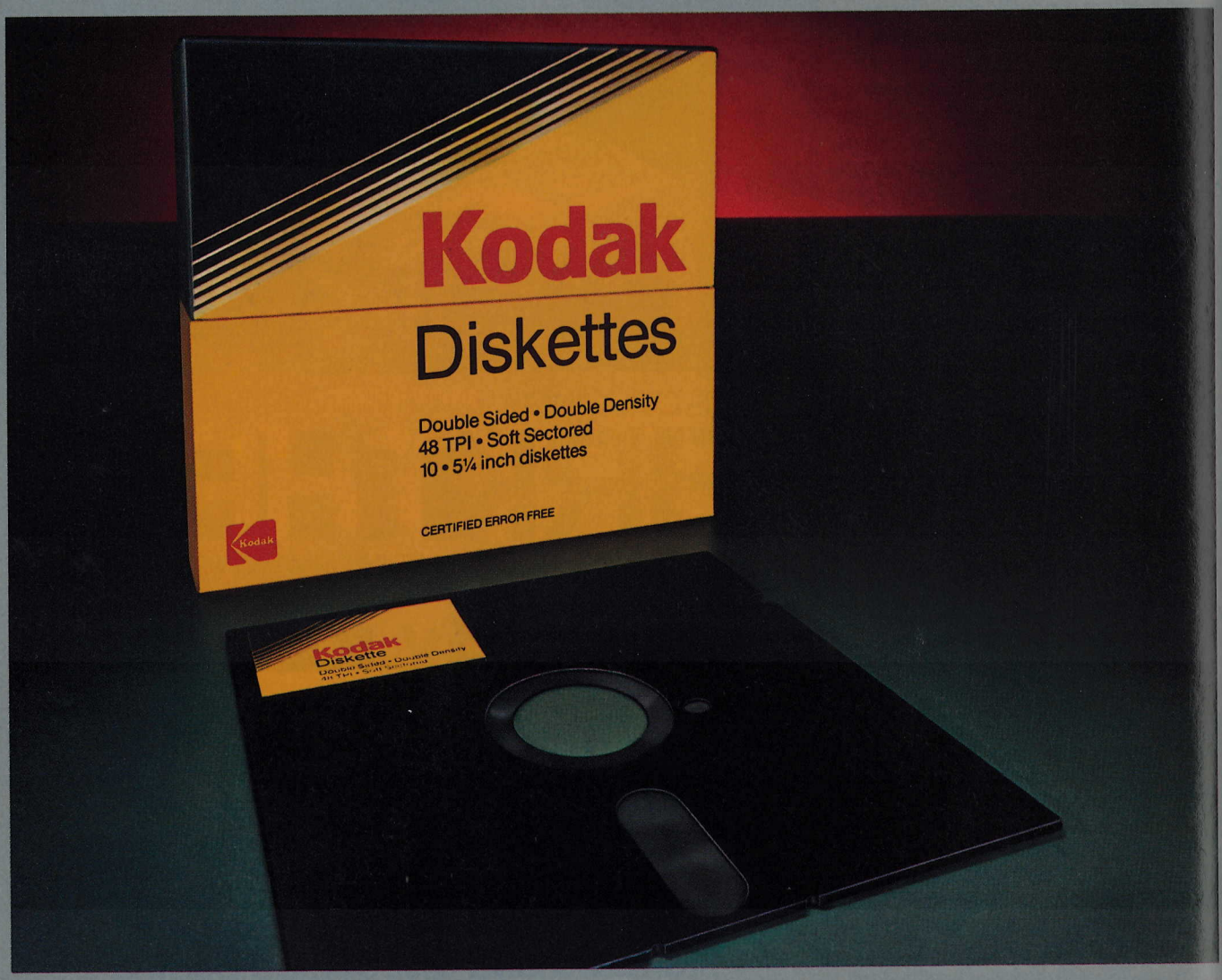

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JULY 1985

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sists that you always enter a credit for every debit.

The element I liked best in the General Ledger was the ability to quickly generate a balance sheet and income statement at any point during the accounting process, giving you an instant profile of the health of the business.

The General Ledger offers the following reports: a list of all accounts, a trial balance, a daily cash sales and receipt journal, and a check register.

It can't, however, generate a Statement of Changes in Financial Position—the report that shows the sources and uses of a business's cash or working capital. As the third major component of an accrual system, in addition to the Balance Sheet and Income Statement, the Statement of Changes in Financial Position is conspicuous by its absence. You can, however, determine your cash position manually by examining your cash sales and cash disbursements.

A real timesaver in the General Ledger is the "posting to the general ledger," or "closing the books" for the period. Back to Basics takes care of everything automatically, allowing for a month-end and a year-end close of the books.

Accounts Receivable and Payable

The Accounts Receivable and Accounts Payable modules are as practically designed as the General Ledger. Within the Accounts Receivable module you can select the level of finance charges and sales taxes, which will then automatically accrue to a customer's account, as well as automatically number invoices. You can also specify a credit limit for each customer.

With the Accounts Receivable module you can keep a flexible customer master list, in which you can key such vital information as finance charges, credit limits, and terms of purchases for selective retrieval of information. You can choose either numerical or alphabetical customer identifications. And at any time you can print a list of customers either on regular printer paper or on mailing labels. You can also generate an "accounts receivable aging report"—a list of customers organized by "aging period" (for example, those 30 days overdue, those 60 days overdue, and so on).

Other options in Accounts Receivable include the ability to specify brief dunning notices for printing on invoices—one notice for each aging period—and automatic invoice numbering. Also, the Accounts Receivable module can print a detailed accounts receivable ledger, a summary of accounts receivable, a sales journal, and a payments journal (the record of cash and checks actually received).

The Accounts Payable module works much the same as the Accounts Receivable module—instead, of course, it keeps track of vendors and suppliers. Among the key reports Accounts Receivable can generate are a vendor master list—which can be segmented like the accounts receivable customer list—a payables ledger, a purchases journal, a disbursements journal, a check register, and a list of actual payments.

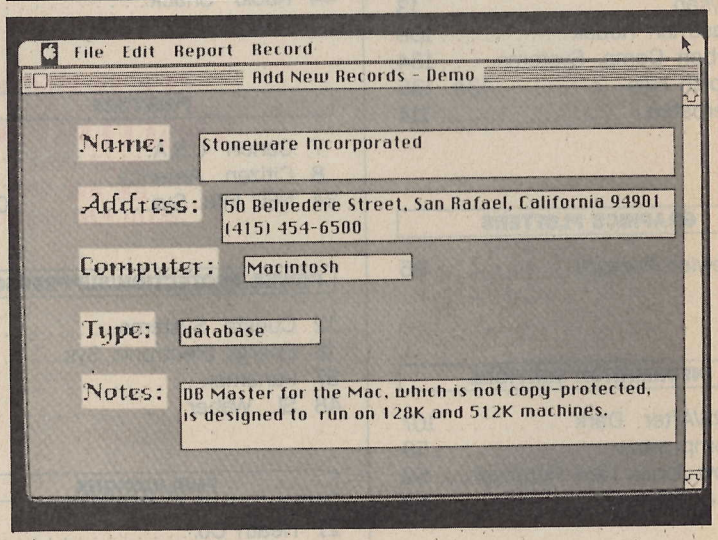
Flexible Power

Back to Basics gives you a good deal of accounting power for a reasonable price. Its capacities make it suitable for an expanding business whose accounting is based on the accrual system. Peachtree's powerful and flexible package can prove to be a real asset to a small business.

—KARL KELLER

Karl Keller is a Chicago-based business writer and coauthor of *How to Raise Capital: Preparing and Presenting the Business Plan* (Dow Jones/Irwin).

DATABASE



DB Master for the Mac

This midrange database manager makes good use of the Mac's special features

At one point, rumor had it that one-third of the independent development teams working on Macintosh software were writing database systems. Many of the products of those efforts have now emerged. Some are new programs written from the ground up; others, like DB Master for the Macintosh, are adaptations of existing software.

As a midrange database program, DB Master for the Mac sits between

the simplest filing systems, such as PFS: File, and full-featured database programs, like dBASE II.

This version of Stoneware's popular program takes full advantage of the Mac's special features while preserving its conventional database structure. And like its namesake, the Mac version is a single file system.

DB Master for the Mac has a couple of unusual features. One is that it consists of two separate applications, each responsible for a different part of the data-handling process. The Create File program lets you define record structures for a database; Use File lets you view and edit information and generate reports.

The unconventional practice of dividing database activities between two separate programs has a significant payoff for users, particularly those who have single-drive Macintoshes. Once you define a file format with Create File, you can remove the application program from the disk, freeing up about 70K bytes of storage area for data. (Naturally, you'd never remove an application from the original disk, but rather from a copy, used to build a particular database.)

That brings up the second unusual feature of DB Master: it is not copy-protected, which means you can conveniently make a copy of the original disk for each data file you maintain. If you have a hard-disk drive, you can transfer the DB Master applications to the hard disk and run them without having to insert the original disk whenever you use the program. This all makes for very convenient use of the program.

Using the Program

Create File lets you build a new or redesign an existing database. It is an easy matter to click the mouse at the point on the screen where a field should be placed and then type its name. Data types are alphanumeric, numeric, and date. Computed field values are determined by formulas, which can be up to 240 characters long, that use values from other fields. You can have 20 computed fields per record. Pull-down menu items let you decide on the font, font size, and type style (for example, italic) of each field name and value.

Maximum record size is 100 fields and 3001 characters. Alphanumeric fields can be up to 3000 characters long; numeric fields, 21. You can't, of course, have all the maximum field limits in force at the same time. A single file can span 44 disks of 400K bytes each. Those with hard disks can create files up to 20 megabytes. Realistically, few people would want to create or work with a file that spans 44 floppy disks. The advantage of being able to spread one file over so many disks comes into play for backup purposes for data on a hard disk.

AT A GLANCE

DB Master for the Macintosh

Manufacturer
Stoneware Inc.
50 Belvedere St.
San Rafael, CA 94901
(415) 454-6500

Price and Hardware Requirements
$195; 128K or 512K Apple Macintosh; can take advantage of external floppy-disk drive or hard disk

Audience
Wide range of Macintosh users with conventional data filing applications

Reviewer's Note
This filing system runs well on both the 128 and 512K Macs.

Although it's always a little risky to predict maximum file size based on an average database, it's helpful in determining whether a particular program fits your needs. Given a typical mailing list database with an average record size of 130 characters, you can expect to enter about 130,000 records in one file. In addition to the type of data you enter, this number, due to technical reasons related to data storage, also depends on the order in which you enter data.

With the Use File module, you enter, edit, and delete data from fields using pull-down menu options and the standard Macintosh editing techniques.

Pull-down menus also are the means by which you search for particular records based on field content. The commonly used options have keyboard command equivalents, so that practiced DB Master users can work more quickly by not having to take their hands off the keyboard to operate the mouse.

DB Master keeps an index of all the records in a data file, organized in terms of a set of key fields that you determine. Although DB Master distinguishes among full-key fields, partial-key fields, and nonkey fields (all of which you determine), you can search on any and all fields, specifying up to 20 per search. The difference in searching among the different types of key fields is speed.

Searching and Sorting

You can search using a combination of the standard comparative operators such as equal to, not equal to, less than, as well as other connectors such as includes, not includes, starts with, any character, and the logical operators and and or.

You can sort on 10 fields at one time in ascending or descending order, alphabetically or numerically, indicating sort criteria with the mouse.

The Use File program also provides report generation capabilities. The report menu lets you design custom reports, modify old ones, and print using the report formats you have designed. Each report can contain up to 100 fields. You can save report formats for later reuse—up to 255 of them for each data file.

This program gives you a good deal of flexibility in report generation, although it enforces an essentially tabular approach. You can send reports to the screen, to the printer, or to a text file on disk for later editing with MacWrite.

The latter feature is a common but useful one. DB Master doesn't print reports in all the glorious Macintosh fonts, sizes, and type styles that it makes available on-screen. Instead, it forces you to choose from among the font sizes that are built into the character sets in the Image Writer printer—from 9 to 17 characters per inch with conventional dot-matrix printer fonts. If you want to work on sprucing up a report, you can save it on a disk and edit it later with MacWrite.

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POPULAR REVIEWS
SOFTWARE

Features and Performance

DB Master's Help option, under the Apple menu, provides brief suggestions appropriate to what you're working on at any time. Many people familiar with the Macintosh may find that these help messages eliminate the need to read the documentation. However, the 132-page manual, which includes a tutorial and reference section, makes for easy reading.

A Copy facility makes backups and consolidates files. Those with hard disks will find this utility especially useful for backing up large files onto floppy disks. You can also use the Copy option for setting up new data files with the same data format; the new data files can contain no data from the source file or a subset of that data. DB Master for the Macintosh makes good use of the standard Mac interface.

A scroll bar lets you move back and forth through the file, rather than having to use conventional, and more restrictive, paging techniques. You can place fields anywhere you like on-screen, and they're easy to move about.

A Wish List

Stoneware did a good job with this product, but that doesn't keep me from wanting even more. First, it would be convenient to be able to directly specify true Macintosh font characteristics for printed reports, without having to go through the MacWrite step.

Second, I'd like an option to ignore case (as in *A* vs *a*) in setting selection criteria for a field. It's far too easy for a simple typing error to cause some very unexpected search results.

Third, the process by which you specify a field's key could be more sophisticated. DB Master takes the whole field as a key specification. It would be more flexible if you could indicate the number of characters from an alphanumeric field that should contribute to the key.

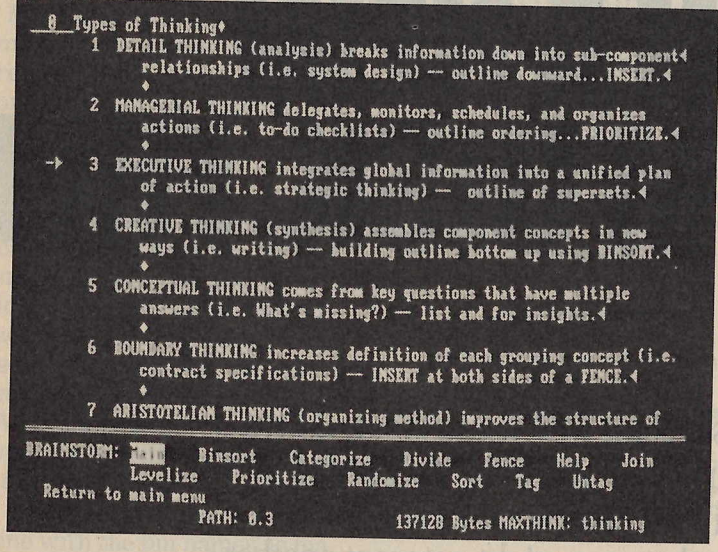
Fourth, nontabular report formatting options would add a great deal of flexibility to reports based on DB Master. Finally, a more powerful file-merge facility would be useful. DB Master can combine two files that

have exactly the same data structures. How much more powerful it would be if files that shared only certain fields could be combined.

DB Master for the Macintosh has enough standard features, together with a number of unusual ones, to satisfy most data-filing needs. It permits very large files, although nonkey searches and creating reports based on nonkey searches are slow processes and, thus, not very practical when data is spread across many disks. This program has features that make it an excellent choice both for hard-disk users and owners of single floppy drives. With more report flexibility, it would be an ideal conventional data-filing machine. —ALLEN MUNRO

Allen Munro is a member of the research faculty of the University of Southern California, where he conducts research on human/computer interface issues. He is the author of *MacPower: Using Macintosh Software*, published by Scott, Foresman.

PERSONAL PRODUCTIVITY


8 Types of Thinking
1 DETAIL THINKING (analysis) breaks information down into sub-component relationships (i.e. system design) -- outline downward...INSERT.
2 MANAGERIAL THINKING delegates, monitors, schedules, and organizes actions (i.e. to-do checklists) -- outline ordering...PRIORITIZE.
3 EXECUTIVE THINKING integrates global information into a unified plan of action (i.e. strategic thinking) -- outline of supersets.
4 CREATIVE THINKING (synthesis) assembles component concepts in new ways (i.e. writing) -- building outline bottom up using BINSORT.
5 CONCEPTUAL THINKING comes from key questions that have multiple answers (i.e. What's missing?) -- list and for insights.
6 BOUNDARY THINKING increases definition of each grouping concept (i.e. contract specifications) -- INSERT at both sides of a FENCE.
7 ARISTOTELIAN THINKING (organizing method) improves the structure of
BRAINSTORM: Insert Binsort Categorize Divide Fence Help Join
Levelize Prioritize Randomize Sort Tag Untag
Return to main menu
PATH: 8.3 137128 Bytes MAXTHINK: thinking

Maxthink

Mind and machine meet as this package helps you put your thoughts in order

Maxthink helps you impose order on that often chaotic whirlwind of ideas churning around inside your head. An outline generator, brainstorming aid, and word processor all rolled into one, this program for the IBM PC and compatibles eases a bit the pain of writing.

Maxthink has some tough competition in the form of Thinktank, but in addition to holding its own as an outliner, Maxthink recommends itself favorably on two accounts. Perhaps most important, at $60 Maxthink sells for about one-third the price of Thinktank for the IBM PC. And Maxthink's Brainstorm feature goes beyond Thinktank's current hierarchical outline format to let you search out the relationships among ideas by manipulating lists of information.

Working with the program is easy enough. Sample outlines get you started and an unobtrusive on-screen menu keeps all options in the fore.

The main menu offers such functions as copy, move, put, get, undo, edit, and insert, which are used for initially entering text into outlines and for editing. Each main menu option contains subsequent menus of command choices. From the main menu you can easily insert and delete topics at any level of an outline. Every menu level contains a Help selection, which provides ample on-screen assistance.

You start writing an outline, which can have 99 levels, by giving it a title and entering text for the first subheading under the title. You enter subsequent subheads and text with just a couple of keystrokes to alert the program to your intentions. On-screen prompts guide you easily through the procedures, making it really difficult to go wrong. And the Escape key always backs you up to the previous stage without permanent damage.

At any level, you can enter as much text as you wish, up to the limits of your system's memory. With 256K bytes of RAM, you can create an outline of about 10 single-spaced pages. With 512K bytes of RAM, outline size jumps to about 50 pages.

Maxthink has both insert and overwrite modes as well as word wrap and automatic paragraph reformatting when you delete words. A serious drawback to the outlining portion of the program is that when you are entering and editing text, you can see only one level of the outline at a time. To view the entire outline, you must switch to the View mode, in which you cannot edit.

The get and put options allow you to place topics and subordinate material into a memory buffer and reinsert them at other places as many times as you wish. The move option changes the location of any part of an outline, simplifying the manipulation of outline segments.

Maxthink optionally numbers each topic and instantly renumbers everything when you relocate sections. Any operation performed on a heading is automatically appropriately reflected on its subheadings. You can print outlines with the traditional labels (I.A., 1.a., etc.) or without labels.

Brainstorming

Maxthink's outlining feature alone is useful and neatly executed, but it's through its brainstorming feature that Maxthink distinguishes itself. If

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Inquiry 51

an idea processor is to be truly valuable, it ought to help you search out the relationships among ideas. You could do this manually, of course, but a computer removes the pencil-and-paper tedium and thus encourages playful experimentation. Maxthink does this in several ways.

For example, Maxthink will help you rank a list of thoughts, items, or whatever. When you choose the Prioritize command, you are asked if you want to work from the most important down or the least important up. You then proceed through your list according to the items' importance. Maxthink, of course, does not presume to know what's important; it merely prompts you to make a decision and puts the topic in its assigned place.

Categorizing

In addition to ranking items, Maxthink categorizes them via its Binsort function. Let's say you have a list of ideas that you wish to sort into three categories: brilliant, so-so, and losers. Binsort helps you place the items into "bins" labeled accordingly. After naming the bins, you go down your list specifying the bin in which each item should be tossed. At the end of the process, you have an outline with the bin names as major headings and the properly sorted ideas as subtopics.

Maxthink time and again demonstrates attention to detail and consideration of human foibles. For example, it understands that you sometimes won't immediately know in which bin an item belongs. In such cases, all you need do is hit the Return key to put the undecided item at the bottom of the list. When it rises to the top again, you may know where it belongs.

Another way to arrange your lists is with fences, or boundaries, which make it easy to divide an existing list of topics into broad categories. The Categorize option takes the process a step further by making any item that follows a fence heading an indented subheading. By using this option, you may view only main headings (fences) and leave the subordinate material hidden.

You can also use Brainstorm to join or divide topics, to Levelize an outline (promoting all subtopics to main topics), or to arrange your topics randomly to help you identify unseen relationships that at first glance escaped you.

Brainstorm can sort lists alphabetically in ascending or descending order or according to their ASCII values.

Brainstorm is the meat of Maxthink. It is highly flexible at arranging and rearranging text in ways that would otherwise take hours. It facilitates creative thinking, and what's more, it's fun.

AT A GLANCE

Maxthink

Manufacturer
Maxthink Inc.
230 Crocker Ave.
Piedmont, CA 94610
(415) 428-0104

Price and Hardware Requirements
$59.95; IMB PC and compatibles with a minimum of 256K bytes of RAM

Audience
Writers of all abilities

Reviewer's Note
An outline-generator, Maxthink distinguishes itself with its brainstorming feature.

Word Processing

Maxthink's word processor is its weak link. Sufficient for entering text for filling in an outline, it's not enough for full word processing (neither is Thinktank's). It lacks important features such as facilities for underlining and boldfacing text, generating sub- and superscripts and footnotes, and varying margins and spacing within documents.

But Maxthink files can be saved in ASCII or Wordstar format for further work with a full-blown word processor.

Programming Language

As if this were not enough for a $60 program, Maxthink includes a LISP-like programming language, called TPL (for "thought-processing language," of course). The language lets you customize Maxthink, build templates, write utility programs, and even create "advice systems." Such systems, says the Maxthink literature, "can go beyond the Maxthink commands to suggesting ways to approach problems, begin complex writing tasks, or find new ideas." Unfortunately, those who tackle such ambitious tasks will get little help from the manual.

The Maxthink manual is otherwise first-rate. It includes a tutorial, clear descriptions of menus and commands, and helpful guides to writing and organizing thoughts.

Maxthink conveniently allows many shortcuts. For example, once familiar with the sequence of writing and editing commands, you can switch to Maxmode, in which you can enter all commands at once without waiting for prompts. This speeds things up mightily. Since you are likely to find yourself accepting the default parameters on most commands, you can go into rapid-entry mode, a sort of overdrive. When you enter commands in uppercase letters, the defaults are automatically executed.

Free Demo

If you write, you are likely to find Maxthink a valuable software companion. You may even regard it as indispensable once you sample its powers, which you can do without charge. The company offers a free demonstration disk, which will do everything but save, write, and print files.

Maxthink's copy-protection scheme is unobtrusive and lets hard-disk users run the program without inserting a master disk each time.

While similar to Thinktank in its outlining functions, Maxthink additionally gives you a way to easily arrange and rearrange your ideas on-screen until you obtain a satisfying order. Although the program's word-processing capabilities are too primitive to handle anything beyond the very basics of text manipulation, you can use files created with Maxthink with any word processor that can read ASCII or Wordstar text files. All in all, Maxthink is a delightfully practical program and its low price should appeal to writers of all means. —SHELDON L. RICHMAN

Sheldon L. Richman writes a weekly computer column for the *Washington (D.C.) Times* and is microcomputing editor for *Government Computer News*.

The Birth of the Microchip

The Chip
by T. R. Reid
Simon and Schuster, New York, 1985
243 pages, cloth $15.95

The better a tool is, the less conspicuous it is. By this criterion, personal computers, with their cumbersome operating systems and technobull vocabularies, fall somewhere short of a $4 socket wrench set when it comes to tools.

Yet on one level the computer works so well that it is inconspicuous to the point of invisibility: the machine displays the letters you type as if it were the most natural thing in the world. In his new book, T. R. Reid enables us to see how unnatural a wonder it is that computers work at all. And as is revealed by the book's subtitle—*How Two Americans Invented the Microchip and Launched a Revolution*—Reid illuminates the hidden technological wonders of computers by assuming the role of historian.

Reid's historical approach works because the story of the personal computer is, to a large extent, the story of the semiconductor microchip, that now ubiquitous silicon wafer that puts the computer into the hands of anyone with access to a hundred dollars and a Toys 'R Us. The author begins with the problem facing engineers in the late 1950s: they could design circuits that would work miracles, but the designs were so complex that human hands could not wire them reliably.

Enter Jack Kilby and Robert Noyce. Independently these two worked out "the monolithic idea" that solved the "tyranny of numbers." Alter a chunk of silicon with impurities so that it can perform the function of various electronic components that would otherwise have to be wired together. Etch in circuit paths connected to wire leads so the chip can communicate with other devices. Case the whole thing in plastic, mass-produce it so the price drops 99.9 percent in 10 years, and you have a revolution on your hands. But the irony, as Reid points out, is that "not one American in ten thousand could name the two countrymen who invented the circuit and launched the Second Industrial Revolution."

Oddly, Reid seems to misunderstand why his book is fascinating. He writes that "in the microelectronic age, Jack Kilby and Bob Noyce symbolize, if anything, only the modern lack of interest in the humans behind the machines." But *The Chip* is so successful and interesting because, in presenting the story of those humans, it also fully reveals the ideas behind the machines.

Reid has a real flair for conveying difficult technical material—he explains the physics of the chip well. But how it works is only part of the chip's ingeniousness, for the "computer counts as if it had only one finger . . . The real miracle of the 'miracle chip' is that people have devised ways to manipulate this minimal skill so that machines can carry out complex operations." The author is at his best as he covers the logic by which simple on-off switches (the essence of the chip) can be combined in a way that enables us to do addition. He explains in a straightforward manner how those combinations of switches result in numbers being written to the screen.

Even after explaining the importance of Boolean logic, binary math, and the vacuum tube, Reid still has time left over to go into Japanese management techniques (crediting the "do it right the first time" statistical control method of American W. Edwards Deming, who, little known here, is a hero in Japan) and to write a wonderfully amusing chapter detailing the seesaw, ten-year patent battle between his two protagonists. In short, the initial focus of Reid's history unfolds into coverage that is far from narrow.

All of this comes in a style that's informal and humorous; the author includes some awful puns but has the good sense not to draw attention to them (Edison tried a light-bulb filament made from dried grass, "but that went haywire"). All told, *The Chip* is as entertaining as it is informative, and that's saying a lot.

—DAVID WEINBERGER

David Weinberger teaches philosophy at Stockton State College and frequently reviews books.

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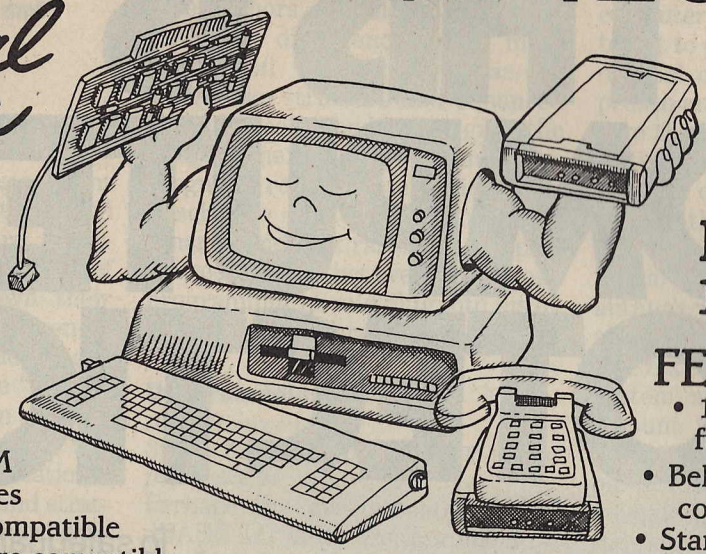

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MICRO REVIEWS

The Complete Investment Book: Trading Stocks, Bonds and Options with Computer Applications

Richard Bookstaber
Scott, Foresman & Co., Glenview, IL, 1985, 404 pages, paper $19.95

"There are as many trading systems as traders," observes options and futures specialist Richard Bookstaber, and he has selected a few of those systems, scaled-down their statistical techniques, and given us a blue-chip collection of ready-to-use programs designed for the "experienced investor." But even curious amateurs will be amazed by the scope of Bookstaber's applications: four main sections cover bond strategies, stock analysis, technical systems, and option trading. Topics and complexity range from the simple bond-valuation programs to one-of-a-kind computerized techniques for cross-currency interest rate arbitrage. While background material is provided, most of the book focuses on the nuances of translating strategy into concise, functional code. Bookstaber's easily customized programs are well documented and available on disk for either the IBM PC or Apple II from the author for $67.50. For the serious investor, this book will pay real dividends.

The Macintosh BASIC Handbook

Thomas Blackadar and Jonathan Kamin
Sybex, Berkeley, CA, 1985, 660 pages, paper $24.95

Blackadar and Kamin, both Sybex staff writers, modestly dedicate their current work to their colleagues "who have given so much of themselves for such little books as these." But this "little book" is actually a massive, incredibly detailed encyclopedia of every Macintosh BASIC command and even some TOOLBOX commands left out of Apple's original documentation for version 1.0 of Macintosh BASIC. Like BASIC handbooks for other dialects, each entry begins with a syntax summary and a brief description of the command's use. But there any similarity with other guides ends, for the authors then provide sample programs, applications, and special notes that, in many cases, are immediately usable as subroutines. The authors emphasize Macintosh BASIC's divergence from more traditional dialects, such as its Pascal-like structure and enhanced graphics commands that give the programmer access to machine-language routines stored in ROM. Blackadar and Kamin's extraordinary handbook rates as an important peripheral that every Macintosh programmer should plug into his or her reference library.

Understanding dBASE III

Alan Simpson
Sybex, Berkeley, CA, 1985, 300 pages, paper $22.95

Perhaps the greatest strength of dBASE III is its programmability, for this allows the construction of sophisticated database management applications that can be used by those unfamiliar with dBASE commands and features. But it is precisely this attraction that the author has most understated in one of the first books on dBASE III to appear in print. Simpson has done more than simply clone *Understanding dBASE II*, his previous work. He notes and discusses new features of dBASE III—such as its public and private memory variables—and treats a full range of dBASE topics. But where Simpson's prior book provided a masterful introduction to all aspects of dBASE usage, this one begins to falter on dBASE III's programmability. The author skimps on elementary programming concepts, neglects guidelines for multifile data management, and mentions specific features of dBASE III only when they further a sample application. Beginners struggling to learn some of dBASE III's basic features will find Simpson's book a good starting point, but those who intend to learn both how to use and how to program dBASE III will be disappointed.

Introduction to UNIX System V

Robert A. Byers
Ashton-Tate, Culver City, CA, 1985, 210 pages, paper $17.95

Robert Byers's examination of an up-and-coming operating system in business computing environments should have been a strong player in Ashton-Tate's bid to capture a segment of the general business-related computer book market. But in his attempt to provide the best of the traditional encyclopedic textbook approach and at the same time to capture the appeal of a much more selective focus, Byers gives us a combination of the dry style characteristic of the former and the rather narrow content of the latter. Even within his limited topic selection, the author's treatment is uneven. He skimps on concepts that are central to Unix (such as its hierarchical file system) and develops features that account for Unix's flexibility and popularity (such as I/O redirection, pipes, filters, and shell scripts) far too quickly and in too little detail for the new user.

The Lotus Guide to Learning Symphony

Lotus Books/Addison-Wesley, Reading, MA, 1984, 419 pages, paper $22.95

It is not surprising that this guide to Lotus Symphony, the result of a new copublishing agreement between Addison-Wesley and Lotus Development Corp., reads much like the documentation for Lotus software. What is surprising is that, despite the limitations of this dry, textbook style, the reader finds an effective survey of Symphony basics. Written for the absolute novice, the guide notes many of Symphony's advanced features (such as programming with macros) only in passing. Instead, the book concentrates on how the basic features of Symphony's spreadsheet, database, word-processing, graphics, and telecommunications modules work—and on how they mesh to form an integrated package. In lieu of lengthy, and sometimes uninteresting, application examples found in other tutorials, the Lotus guide offers careful examinations of Symphony's basic features. When examples are used, they are short and to the point. New Symphony users will appreciate this focused treatment.

—MIKE NICITA & RON PETRUSHA

Mike Nicita and Ron Petrusha are coauthors of *The Reader's Guide to Microcomputer Books*, 2nd ed. (Golden-Lee, 1984).

ASK POPULAR

This month, we explore application questions, beginning with multiuser IBM PCs

OUR OFFICE MAINFRAME HAS SEVeral terminals. We would now like to rely more on personal computers and want to connect the terminals to IBM PCs or compatibles. Can a terminal replace the keyboard and monitor for an IBM PC? What software problems will we encounter? —STEVE CHATMAN
BRYAN, TX

YOUR TERMINALS WILL OPERATE IBM PCs (or another brand of personal computer), but in this arrangement, you are asking a PC to do a mainframe job. Let's take a closer look at this and some alternatives.

Basically, a personal computer is a stand-alone device for processing information. It is generally more versatile and less intimidating than a mainframe but still can do many mainframe tasks. A company can configure each personal computer for specific office applications, such as word processing or data reduction. However, as a company expands, it often needs to share the data on the individual personal computers.

The concept you suggest is called a single CPU (central processing unit) multiuser system. The terminals connect physically to serial ports on a central computer, and each user is assigned a specific memory block for programs and data storage. Because total memory is shared, it may lack the capacity for larger programs such as spreadsheets. You also can connect a hard disk to the CPU, with memory areas assigned to each terminal for storage. Terminals generally aren't capable of stand-alone data processing.

Practically, all this requires extra serial peripheral cards in the personal computer and a multiuser operating system. Disadvantages include slower response time and the possibility that one user will "crash" the CPU, destroying the data generated by others.

One company addresses this problem with a 256K-byte PC Slave processor board that allows independent operation with no speed degradation. It accommodates up to 32 users with the PC-File Server, which provides additional expansion slots, a hard-disk drive, and a high-speed streaming tape backup. It's available from Advanced Digital Corp. (5432 Production Dr., Huntington Beach, CA 92649, (714) 891-4004).

Instead of using the terminals, another approach worth considering is a local network, also called a local area network, or LAN. A local network links two or more computers to transfer programs or files. Also connected are shared printers, plotters, and hard-disk drives. Because they're hard-wired together, all units can communicate and transfer data at processor speed. Each microcomputer network station offers off-line processing as well. Some networks can link IBMs and Apples to preserve software preferences while still benefiting by the network.

Local networks for the IBM PC include Omninet ($1495 to $5495) from Corvus Systems (2100 Corvus Dr., San Jose, CA 95124, (408) 559-7000); Etherseries (starter kit, $1890) from 3Com Corp. (1365 Shorebird Way, Mountain View, CA 94043, (415) 961-9602); and PCnet (starter kit, $1090) from Orchid Technology (47790 Westinghouse Dr., Fremont, CA 94539, (415) 490-8586).

A third alternative is combining both concepts. Use the IBM PCs in a local network and obtain a multiuser CPU for your existing terminals. Depending on company size and data-processing needs, this may be the most efficient and cost-effective approach.

IS THERE A HARD DISK THAT WORKS with both Apple and IBM computers? —ANTONIO DE PADUA L. GUARACIABA
SÃO PAULO, BRAZIL

YES. A HARD-DISK SYSTEM CONSISTS of a mechanical storage unit, a controller card, and a power supply. Some drives, designed to be mounted inside a computer and use the main supply, need no external power. Hard disks are interchangeable if the company makes controller cards to interface the computers you have in mind.

Manufacturers offering hard disks for both Apple and IBM computers include Davong Systems (27 Humboldt Ct., Sunnyvale, CA 94089, (408) 734-4900); Eicon Research (Penthouse Suite, 520 Fifth Ave., New York, NY 10036, (212) 719-5353); and Genie Technologies (Suite 402, 31117 Via Colinas, Westlake Village, CA 91362, (818) 991-6210).

I WANT TO SELL A COMPUTER BUT can't find a buyer. Any suggestions? —M. ORKIN
BRIDGETON, MO

SURE. A LOCAL SALE IS BEST, SO YOU can demonstrate the unit and eliminate the headaches of shipping and payment. Local newspaper classifieds often carry computer ads in an electronics or business equipment section, and the cost is reasonable.

Company bulletin boards or newspapers attract large audiences and generate information inquiries. Dealing with fellow employees is usually easier than with total strangers.

Computer clubs often have bulletin boards and newsletters for buying and selling equipment. A user's group for your computer would be a good place to start. Your local computer stores can direct you to clubs in the area and also may have a bul-

letin board for posting your ad.

If local advertising doesn't work, try a national publication. *Computer Shopper* (POB F, 407 South Washington Ave., Titusville, FL 32781, (305) 269-3211), is a monthly publication for buying and selling computer hardware and software. Potential buyers read it.

The wording of the ad is important. You should clearly explain what is offered, its condition, and price. List any accessories included. Don't use abbreviations because newcomers may not understand them. Potential buyers often offer less than the listed price. Bargaining increases your chance of a sale, but if you don't want to, add the word "firm" to your price.

WHERE CAN I GET AN UP-TO-DATE list of software for my Sanyo 550-2 computer? —BARRY NELSON
LOMPOC, CA

THE SANYO 550-2 IS DATA-COMPATIBLE with the IBM PC and will read disks written on it. Much IBM PC software that doesn't include graphics will run. If software is truly MS-DOS, it will work; if it was written for specific IBM PC firmware, it probably won't. A complete listing of compatible software can be obtained from Sanyo Business Systems Corp. (51 Joseph St., Moonachie, NJ 07074, (201) 440-9300).

I OWN AND OPERATE A FAIR-SIZED cattle operation in southwestern Ontario. I have seen much agricultural software in computer magazines, but most is related to accounting. What about agricultural software that addresses the other facets of this business?
—STAN EBY
KINCARDINE, ONTARIO

MANY PACKAGES ARE ON THE MARket. Software that may address your needs includes: Beefup 3.01 ($600) and Pedigree ($300) from St. Benedict's Farm (POB 366, Waelder, TX 78959, (512) 540-4814); Feed Formulation ($95) from Computer Agri Venture (105 South Third, St. Peter, MN 56082, (218) 828-5302); and Professional Ration Package ($3000 for CP/M systems, $4000 for MS-DOS version) from Agricultural Computer Applications (1320 Notre Dame Dr., Davis, CA 95616, (916) 756-8946).

MY BUSINESS HAS AN ALTOS 580-20 computer with the MP/M II operating system. I want a compatible portable computer for home and business but am having trouble finding one. Can you recommend any that would tie into my Altos from home?
—BILL KNOX
BALTIMORE, MD

IF YOUR GOAL IS JUST TO COMMUNIcate with your Altos at the office, any computer with a standard serial port will do. Connect an autoanswering modem to the Altos and any modem to your home computer. This arrangement will allow access just by dialing the phone, and your home computer will function as a simple terminal. You'll need terminal-emulation software for the portable at home but none for the Altos. The MP/M II multiuser operating system works well in this application.

Finding a portable that will run the same software is slightly more difficult because the Altos software is configured for an 8-inch disk drive, and virtually all portables use 5¼-inch drives. You can overcome this incompatibility by downloading the software from the Altos through the modem to the portable or by directly connecting the two serial ports. For this transfer, you'll need communications software for both the Altos and the portable.

I WANT TO SWITCH MY COMPUTER between two serial printers. Can I connect a "Y" printer cable and just turn on the desired printer, or must I have a switching box?
—JOHN WELIN
ELMHURST, IL

THE "Y" PRINTER CABLE (A CABLE where one input splits into two outputs, each with the same connections) will sometimes work if only one printer is on at a time. However, some printers with nonstandard serial connections can create an unintended ground on lines for the active printer. If either printer is this type, the "Y" will not function correctly.

The sure but more expensive approach is one of the many available switchboxes. Suitable two-way switch units can be obtained from: Devoe Co. (POB 58051, 1500 Martin Ave., Santa Clara, CA 95051, (408) 980-1360), Model 6831-X ($119); Globe Computer Supplies (Dept. 52, 45 South Service Rd., Plainview, NY 11803, (800) 8-GLOBAL), Model C4500 ($119); and Moore Computer Supplies (POB 20, Wheeling, IL 60090, (800) 323-6230), Model L64758 ($149).

I AM INTERESTED IN AN IBM PC XT bar-code program with light pen that will handle 10,000 inventory items. Does anyone offer one?
—JOHN SALANI
PLEASANTON, CA

YOU DON'T NEED A PROGRAM DEsigned exclusively for a bar-code scanner. Bar-code scanners can work through the keyboard with any suitable inventory program. Bar-code scanner input is treated as keyboard entry data.

PCScanner Model 240 from Caere Corp. (100 Cooper Court, Los Gatos, CA 95030, (408) 395-7000) includes a keyboard interface board that plugs into the IBM PC and is available with either a standard ($745) or high-resolution pen ($785). The PC-300 Bar-Code Reader from TPS Electronics (4047 Transport, Palo Alto, CA 94303, (415) 856-6833) includes a device that attaches between keyboard and computer without affecting normal keyboard operation. The $795 unit includes a stainless steel wand. For a third configuration, Key Tronic (POB 14687, Spokane, WA 99214, (509) 928-8000) offers the Model KB 5152B keyboard with bar-code wand. All necessary electronics are in the keyboard and no additional space is required. It reads all popular codes, both forward and backward, offers four different wands, and sells for $795. □

Ask Popular is a monthly column conducted by contributing editors Harv Weiner and Steve Ciarcia to answer general questions about small computers. Send your questions to: Ask Popular, POB 397, Hancock, NH 03449.

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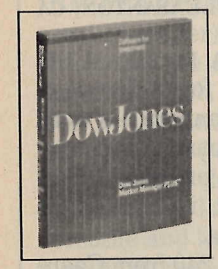

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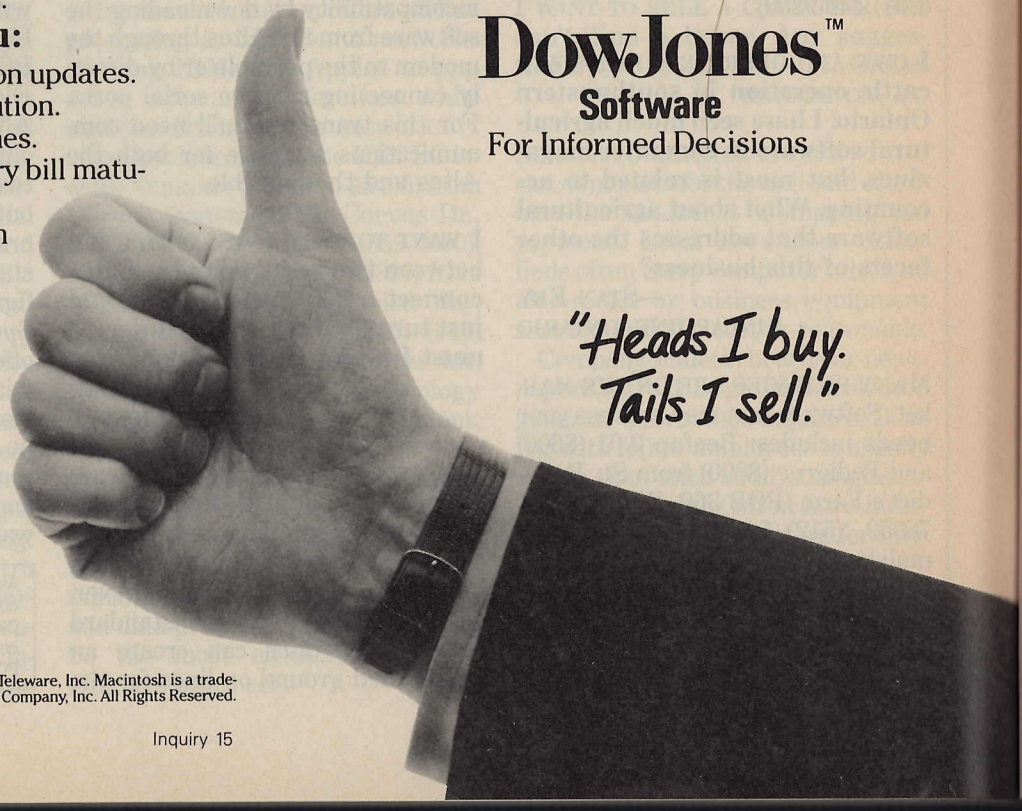

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NEW PRODUCTS

A non-Apple LCD for the IIc, and other new hardware and software

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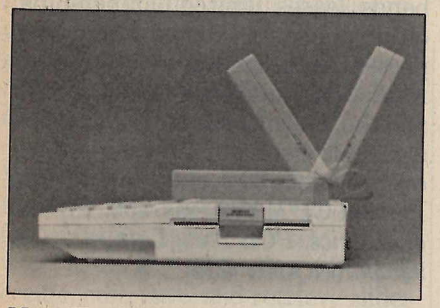

New IIc display: The liquid crystal C Vue, a flat-panel screen for the Apple IIc, displays 24 80-character lines and graphics. It mounts atop the computer, adjusts to any viewing angle, and folds flat for storage. A contrast adjustment compensates for varied lighting conditions. The compact unit measures 11⅝ inches wide by 6¼ inches high and weighs 2 pounds 4 ounces. It operates from the IIc power supply, $599. *SWI International Systems, Suite 2, 7741 East Gray Rd., Scottsdale, AZ 85260.* [INQUIRY 200]

Double-duty monitors: New composite color and black-and-white monitors from General Electric offer high-quality graphics, 80-character displays, and your favorite television shows. For monitoring, unneeded television circuitry is switched out while computing. Both models will accommodate computers, video games, TV antennas, VCRs and videodisc players. Thirteen-inch color Model 13BC5509X, $489.95; twelve-inch black-and-white Model 12XR5204X, $129.95. *General Electric, Electronics Park, Syracuse, NY 13221.* [INQUIRY 201]

High-resolution display: The MB-142 black-and-white monitor shows graphics and text with 720 by 350 resolution. Display switches from black-on-white to white-on-black. The 14-inch monitor connects to the monochrome board of the IBM PC and compatibles with no additional circuitry, $375. *Roland DG, 7200 Dominion Circle, Los Angeles, CA 90040* [INQUIRY 202]

New business micro: The IBM-compatible Cobra contains an 8086 microprocessor with 8-megahertz operating speed and a Z80A for 8-bit, CP/M-80 compatibility. It includes a 10-megabyte hard disk and a double-density, double-sided floppy-disk drive. The flexible micro has six IBM expansion slots plus serial and parallel ports. Other features are high-resolution color graphics, IBM-enhanced keyboard, and a real-time clock. The 256K-byte RAM expands to 640K bytes. Comes with Wordstar, Supercalc 3, Condor I, MS-DOS, C Term, and GW BASIC, $4995. *Seequa Computer Corp., 8305 Telegraph Rd., Odenton, MD 21113.* [INQUIRY 203]

Versatile micro: The Galaxy MFB computer system from England is designed to topple the computer "Tower of Babel." Users can read and write to disks from some 250 different microcomputers. A library of 400 existing formats comes with the computer, with free updates provided for six months after purchase. The company says new formats are easy to add. The Z80-based system is designed for companies that use a variety of different and incompatible microcomputer systems. The basic model comes with 64K bytes of RAM and both hard- and floppy-disk drives. The Galaxy MFB costs $3000 to $6000, depending on options. *Gemini Microcomputers Ltd., 18 Woodside Rd., Amersham, Bucks, England HP7 0BH.* [INQUIRY 204]

Computer-aided design: Protean is powerful enough for corporate designers and engineers, yet affordable by at-home professionals. Applications include printed circuit and mechanical design, facilities planning, architectural work, and mapping. Works as a full-featured stand-alone computer or desktop supplement to a mainframe. Comes with 512K-byte RAM, 10-megabyte hard-disk and one floppy drive, keyboard with 127 programmable keys, color monitor, tablet digitizer, and AutoCAD 2 design and drafting software. For MS-DOS, $7950. *CAD Counsel, 231 East Lemon, Monrovia, CA 91016.* [INQUIRY 205]

Data protection: Installed at home and remote locations, Cryptopath converts your data to "alphabet soup" for prying eyes. The units encode with ALFIE (algorithm for information encryption), a cipher that resists cryptanalytic attack by algebraic reducibility, special-purpose integrated circuits, and parallel processing. Cryptopath is RS-232C compatible and operates at baud rates up to 9600, $449. *Integrated Applications, 8600 Harvard Ave., Cleveland, OH 44105.* [INQUIRY 206]

Color graphics board: The 32K-byte Colorview graphics board stores two pages of graphics to IBM's one, the company says, and plugs into the same slot on the IBM PC. You can display one page while creating a second in memory. You also can swap the pages with a single BASIC instruction and create animated displays. The board has connections for a light pen and RF modulator for home TV and works with most composite and RGB monitors, $289. *Princeton Graphic Systems, 170 Wall St., Princeton, NJ 08540.* [INQUIRY 207]

More memory: The Short Stuff board fits IBM short or long slots and can expand memory to the 640K-byte maximum. It works smoothly with such programs as Lotus 1-2-3, Symphony, and Framework. Included are a parallel interface, software for RAM disk simulation, and a spooler for continuous computing while the system prints information. For the IBM PC, XT, 3270, and compatibles. With 64K bytes of RAM, $295; 128K bytes, $395. Piggyback expansion board with 256K bytes, $495. *Seequa Computer Corp., 8305 Telegraph Rd., Odenton, MD 21113.* [INQUIRY 208]

Secure communication: The Oz Guardian is a 300/1200-baud modem with microprocessor-based security features. After receiving a password, it disconnects the incoming call and verifies that the caller is legitimate by dialing the password holder's telephone number. You can program the unit for various levels of security. The Oz Guardian includes automatic logging and a directory for 250 telephone numbers, $750. *International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865.* [INQUIRY 209]

More modems: New Hayes-compatible Avatex modems are aimed at the nontechnical user. All models match Bell specifications and adjust automatically to incoming baud rates on touch or pulse dial telephones. BASIC program for data access is included. Prices are $64.49 for 300 baud and $299.99 for 1200 baud. *E and E Datacomm, 2115 Ringwood Ave., San Jose, CA 95131.* [INQUIRY 210]

Portable penwriter: The Panasonic RK-P400 produces letter-quality text and graphs as a computer printer or stand-alone typewriter. Its graphic pen system prints in four colors and 10 different sizes. A 4K-byte memory stores about two pages of text. Creates pie charts, bar and line graphs, and radar charts, and has text-editing capability. Features includes full-size keyboard and 24-character LCD display with up-down and left-right scrolling. The RK-P400 weighs 5 pounds, 11 ounces and operates with batteries or AC adapter, $349.95. Optional RS-232C cables for computer connection. *Panasonic, One Panasonic Way, Secaucus, NJ 07094.* [INQUIRY 211]

Letter-quality portable: The Riteman LQ weighs only 6.6 pounds and fits in a standard briefcase. It produces 80-character lines of letter-quality elite type with a rotating character drum and easy-to-change ink roller. It has friction feed and bidirectional printing at 12 to 20 cps. It is compatible with many word-processing packages and handles basic Wordstar functions. It comes with Centronics parallel interface, $299. *Inforunner, Airport Business Park, 431 North Oak St., Inglewood, CA 90302.* [INQUIRY 212]

Low-cost color printer: The CMP-9022 plotter/printer with black, red, green, and blue ballpoint pens responds to more than a dozen graphic commands and prints 80- or 40- character lines on 4½-inch paper rolls. Supplies for the compact unit are available at Radio Shack stores. For the Apple II family and IBM PC, $149.95. *Video Logic Corp., 597 North Mathilda Ave., Sunnyvale, CA 94086.* [INQUIRY 213]

Software

Financial planning: Bottomline I is a quarterly model for corporate financial planning, analysis, and forecasting: it develops historical and projected income statements, balance sheets, changes in financial position, and ratio analysis. The software forecasts by exponential smoothing. For MS-DOS and CP/M computers, $195. *ILAR Systems, Suite 200, 1300 Dove St., Newport Beach, CA 92660.* [INQUIRY 214]

Legal accounting: The Legal Accounting Software System was successfully tested in lawyers' offices for more than three years. It does trust accounting, records disbursements, and monitors accounts receivable and work in progress. Daily summaries accurately audit all transactions. An aged accounts-receivable report highlights outstanding balances and overdue accounts. For MS-DOS and CP/M, including IBM, Texas Instruments, and Zenith, $995. *Mountain Software, POB 4364, Hamilton, Ontario, Canada L8V 4L8.* [INQUIRY 215]

Investment analysis: SOLO analyzes your personal investment portfolio with the power of your computer. You can include any type of investment: real estate, money market and mutual funds, stocks and bonds, leases, limited partnerships, or art objects. SOLO calculates net present value and after-tax rate of return on individual investments and the whole portfolio. It also gives a graphic display of projected values over the next 30 years. For the IBM PC and CP/M systems, $90. *Financiometrics, POB 1788, Lafayette, CA 94549.* [INQUIRY 216]

Tracking tenants: Rentman/Apartment Manager automates property, tenant, and checkbook management. In addition to a complete accounting package and general ledger, features include comparison of market rent to actual rent, dates and amounts of rent increases, delinquent tenant reports, vacancies by unit type, expenses per unit type, lease expirations, and tenant histories. It handles up to 10,000 properties with 10 to 10,000 units each. For the IBM PC and XT, Columbia Data, Eagle, Tandy 2000, Compaq Plus, Zenith 160, and Texas Instruments Professional, $1895. *Data Mill, POB 98, Thornton, PA 19373.* [INQUIRY 217]

Fat Mac outlines: Think Tank 512, for the Macintosh with 512K bytes, combines outline processing, word processing, and graphics. Paragraphs, outlines, and graphics from MacPaint and other software can be combined and moved. It labels entries automatically and creates a reference library with up to 3000 headings. Each heading will store 35 pages of text and graphics. Users can concentrate on specific areas or make global changes quickly. For business and professional users, $245. Also for the Apple II family and IBM PC. *Living Videotext, 2432 Charleston Rd., Mountain View, CA 94043.* [INQUIRY 218]

Multitasking: With DoubleDOS, you can run two programs at once without modifying existing DOS-based software. The two programs share the memory and central processing unit. Only one program is visible at a time, but you can change the keyboard and screen back and forth for interaction with either. DoubleDOS is compatible with a variety of software, including Lotus 1-2-3, dBASE II, and Wordstar. The company recommends 192K bytes or more for running simultaneous programs. For the IBM PC, XT, or AT; priced at $99. *Softlogic Solutions, 530 Chestnut St., Manchester, NH 03101.* [INQUIRY 219]

Vary your type: DGI Type Shop turns your plotter into a typesetter for creating signs and text slides with a variety of styles. You can create, edit, save, and retrieve slides with five type styles built into the software and add optional fonts from disk. Works with the Hewlett-Packard 7470A and compatible plotters. For the Apple II family, the IBM PC and PCjr, $175. *Decision Graphics Inc., POB 2776, Littleton, CO 80161.* [INQUIRY 220]

Flowchart design: You can make any kind of procedural chart with Easyflow, using simple commands. The assembly-language program works with all printers and produces a typical flowchart in 12 seconds, centering text and routing lines automatically. You can add new shapes to the 18 already in the program. Easyflow comes with a 111-page manual and 10 demonstration flowcharts. For MS-DOS, PC-DOS, and CP/M-80, $49.95. *Haventree Software Ltd., R.R.#1, Seeley's Bay, Ontario, Canada K0H 2N0.* [INQUIRY 221]

More Mac memory: A new software/hardware combination upgrades the Macintosh to 512K bytes of core memory and 512K bytes of RAM disk. With MegaRAM software, you can load any file or application program from the RAM disk to the core memory three to six times faster than with a disk drive. Compatible with 128K-byte and 512K-byte Macintoshes, $1595 to $1895. *Micrographic Images, 19612 Kingsbury St., Chatsworth, CA 91311.* [INQUIRY 222]

Report writer: Quickreport quickly produces simple or complex reports for Ashton Tate's dBASE II and dBASE III. Reports accept your defined calculations on data, and you can perform group breaks on up to 16 fields. A high-speed sort is included. For the IBM PC, $295. *Fox and Geller, 604 Market St., Elmwood Park, NJ 07407.* [INQUIRY 223]

Speaking Spanish: Your computer will speak Spanish with an Echo or Cricket voice synthesizer and Spanish Talker software. More than 700 entries in multiple-choice format reinforce your knowledge of vocabulary, verb conjugation, and pronunciation. You also can create new files and modify the existing database. For the IBM PC and Apple II family, $75; discounts available on voice synthesizers. *SEI, 2360-J George Washington Hwy., Yorktown, VA 23692.* [INQUIRY 224]

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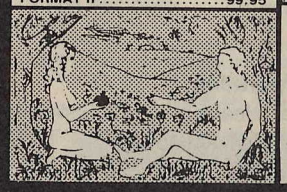

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Colorwriter 4: An integrated program, Colorwriter 4 contains word processing, graphics, information management software, and a calculator, with full-color capability in all features. Colorwriter 4 supports IBM's new color graphics printer. For the IBM PC, XT, AT, and most compatibles, $199.95. *Hamilton Software, POB 20645, El Cajon, CA 92021.* [INQUIRY 226]

Computer communication: LYNC 4.1 lets IBM computers talk to a variety of information services, mainframes, and micros. The software accommodates baud rates up to 9600, batch files of any length, automatic unattended operation, password protection, and automated logging and send/save routines. It automatically matches data bits and the parity of the system you communicate with. Using LYNC 4.1, you can exchange files with more than 200 different systems. For the IBM PC, PCjr, XT, and AT, $195. *Norton-Lambert, POB 4085, Santa Barbara, CA 93103.* [INQUIRY 227]

Budget word processor: Written in C and assembly language, Dear Word offers a comfortable interface and an assortment of features, including windowing, global search and replace, cut and paste, word-wrap, paragraph reform, and scrolling. A 25-page manual is on the disk—you print it. For the IBM PC and compatibles, $15. *Honeybit Software, 5430 SW Helen Ave., Corvallis, OR 97333.* [INQUIRY 228]

File transfer: Missing Link, a file transfer system, is now available for the Apple IIe and Macintosh. No modem is required. Using a connector cable, you can transfer files to and from the Apples, IBM PC and XT, and Epson QX-10 and PX-8. The program includes error checking and operates with only two commands. $99 to $129. *Marlow & Associates, 136 Lowell St., Somerville, MA 02144.* [INQUIRY 229]

Tax planning: Designed for year-round use, Tax Time Saver automatically calculates regular tax, income averaging, alternative minimum tax, self-employment tax, and other items. It's easy to use yet powerful enough to cover a variety of tax situations. Handles preparation as well as planning. For the Apple II family and IBM PC, $295. *P. Douglas and Associates, POB 208, Kerkhoven, MN 56252.* [INQUIRY 230]

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Continued from page 64—

features as one-touch dialing, concurrent voice and data transmission, and a built-in calculator and clock. The Juniper's functions are available while you're working with other applications programs on the IBM PC, which should have at least 256K bytes of RAM, preferably 384K bytes.

These phone-modem add-ons seem to be a much better buy than their voice-mail counterparts, since they do not require hard disks for storing speech. Yet the cost remains high, and they are probably worth it only if you can profit from the special conveniences they offer. Also keep in mind that their sophisticated communications and telephone-management functions often require a substantial amount of memory. This demand can limit the usefulness and sometimes the speed of these add-ons, particularly if you work with large spreadsheets or other applications that require a lot of memory.

All-in-One Machines

Adopting a different approach to merging computers and phones are the personal telecommunications computers and office network systems, the all-in-one machines. These devices not only save space on the desktop, but they're also fun. They give you the feeling of sitting before a magic console, a master of tremendous networks.

One personal computer in this category is the Zaisan ES.3, which retails for $2595. An IBM PC-compatible, the Zaisan ES.3 comes with 128K bytes of RAM (expandable to 640K bytes), an internal 300-baud modem, and runs most PC software. The Zaisan also has two tiers of keys. The lower one is a standard computer keyboard, while the upper one, the "dashboard," is a telephone keypad with 13 programmable function keys and 8 dynamic soft keys for menu selection. The screen holds 25 rows of 80 characters, and the telephone rests on the left. The computer comes with software that includes a telephone log and directory, appointment calendar, and notepad.

The Zaisan ES.3 has two telephone lines, so you can speak on the phone while accessing an on-line database. You can also access an on-line database while running a program, for example, a spreadsheet. The telephone has various other features, such as a speakerphone and the capacity for three-way conversations. It lets you dial preprogrammed phone numbers with a single keystroke. It performs calendar management and lets you set visual or audio alarms.

The outstanding virtue of the Zaisan ES.3 is, of course, its price, competitive with the IBM PC itself. While this computer lacks the full range of features of the Watson or the Cosystem, it brings computer-phones within reach of the average buyer and thus indicates the path the mass market may take. (For a full review of the Zaisan ES.3, see page 78).

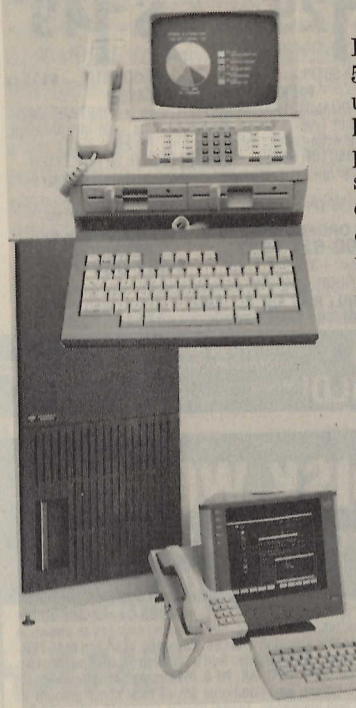
At the next step up in sophistication and price are telecommunications computers designed specifically for businesses and corporate offices. Drawing on AT&T's expertise in communications, for instance, is the new Unix PC.

To mention a few of its features, the $5590 multiuser Unix PC comes with three modular phone connections, a built-in 300/1200-baud modem, a speakerphone, and telephone-management and communications software. The Unix PC's telephone features are extensive, including one-key dialing, automatic last-number redial, and a phone directory and log. A series of menus gives quick access to all functions. With the Unix PC's multitasking capabilities, you can simultaneously talk on the phone, transmit a file, and view information from another file in an on-screen window.

Rolm's Cedar is a similar computer-phone hybrid. This hump-shaped computer has a phone that sits cradled to the left of the screen. The machine is IBM PC compatible and comes with two disk drives and 512K bytes of memory, 384K bytes of it available to the user. Like the Juniper, the Cedar works within the context of Rolm's CBX.

The Cedar's telephone has an impressive array of features. For instance, its "Do Not Disturb" command halts or redirects all incoming calls and can be useful if you want a stretch of uninterrupted time in which to work. "Executive Override" lets you interrupt a call on another extension. Such functions, of course, operate within the office

OFFICE SYSTEMS



CEDAR

IBM PC compatible with 8088 microprocessor; 512K bytes of RAM (384K bytes accessible to user); two 5¼-inch disk drives; detachable keyboard; monochrome monitor; built-in telephone with handset; 1 to 4 phone lines; speakerphone; Rolmlink interface software for connection to Rolm CBX; telephone-management, communications, and desktop-management software; $4295.

Rolm Corp., 4900 Old Ironsides Dr., Santa Clara, CA 95054; (408) 986-1000

VOICESTATION

Terminal with Motorola 68000 microprocessor; 128K bytes of RAM; 12-inch monochrome monitor; detachable keyboard; built-in telephone keypad and handset speakerphone; RS232-C interface; programmable sound generator (options include mouse, headset, and microphone); for use with Sydis Information Manager ($45,000 and up) that supports 8 to 200 Voicestation terminals; $2600 per terminal.

Sydis Corp., 410 East Plumeria Dr., San Jose, CA 95134; (408) 945-1100

CBX system, though "Conference" allows a conference call with up to eight parties, two of whom may be outside the CBX.

The Cedar runs most of the software written for the IBM PC, and you can use the phone without interrupting your work on the computer. It sells for around $4300.

Another new entry is the Telecompaq, recently introduced by Compaq Telecommunications Corp. and scheduled for release in June, as of this writing. The Telecompaq, says H. L. Sparks, the company's vice president of sales, integrates a computer, modem, and phone into a single convenient workstation for managers and executives who need to efficiently retrieve, analyze, and communicate information.

Like Compaq's Deskpro, the wedge-shaped Telecompaq is an 8086-based IBM PC compatible. On the right side of the screen are two rows of special keys that are used to select telephone functions and phone lines. A third floppy-disk drive sits in the base of the unit beneath the other two drives (one of which can be replaced by a hard-disk drive).

The Telecompaq's unusual third drive and 128K bytes of RAM are dedicated to running the built-in communications and desktop-management software, which includes a phone directory, electronic mail, calendar, notepad, and calculator. Using the function keys on the main keyboard lets you quickly switch between these various tasks and applications like spreadsheet analysis and word processing. You can also carry on simultaneous voice and data communications without interrupting work in other applications programs. For example, if you're working with 1-2-3 and need additional data from, say, a colleague, you use the function key labeled "directory" to mark your place in the spreadsheet and display the phone directory. With the telephone's speed-dial feature, you make the phone call, get the data you need, then press the function key labeled "computer" to resume your work in the spreadsheet where you left off.

The basic model costs $4195 and comes with 384K bytes of RAM (expandable to 640K bytes), three disk drives, a built-in Hayes 300/1200-baud modem, and a separate telephone with a speakerphone and two phone lines. (Higher-priced models have five phone lines and a 10-megabyte hard-disk drive.) The computer also has two full-size expansion slots that will accept plug-in boards designed for the IBM PC, including those for networks. To insure that the Telecompaq is configured properly for PBXs and other telephone systems, the company plans to sell the computer chiefly through phone companies and other firms that sell or service telephone equipment.

The Heavyweight

Perhaps the most complete computer-phone is the Voicestation 1 from Sydis. "Our goal," says Steve Milne of Sydis, "is to be an information center that allows people to

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share all the different resources they may want." The Voicestation has a terminal shaped like an equilateral wedge. One side has a screen on which you can do word processing, spreadsheet functions, and other computer tasks. Beneath the screen and to its left are buttons that control such features as the speakerphone, hold, and the five telephone lines. The phone itself—dialpad and receiver—reposes just to the left and slants up for easy access.

The Sydis Voicestation offers both voice and data mail. Moreover, it can combine the two, so you can add oral comments to written transmissions ("voice annotation"). This feature enables executives, say, to bring letters typed by their secretaries up on a computer screen, comment orally on them, and send the letters with comments back at once for retyping. In addition, as with the Watson, you can edit speech, interpolating oral remarks in the manner of a word processor.

The problem of voice storage does not loom so large with the Voicestation, since it comes in an entire office system. The screen on your desk is only a terminal, and voice memos are placed in the 3.2-gigabyte memory of the central unit. That much storage can hold at least 250 hours of speech.

Voicestation 1 terminals are connected to a unit called the Sydis Information Manager, a centralized facility containing common resources that are shared by all the connected workstations. The central unit is powered by a set of 68010 microprocessors, and an entry-level system is designed to support up to 200 users. As expected, the price of the system matches its capabilities. Prices for the central unit start at $45,000, and each Voicestation 1 terminal costs $2600.

The Voicestation and other telecommunications computers are easily the most impressive of the computer-phone hybrids and the most expensive. But they are the Buck Rogers apparatus of the information jockey and, price aside, pleasing equipment for almost anyone to own.

A Solution Whose Time Is Coming

Of course, you don't have to buy a Voicestation to reap the benefits of computer-phone integration. You may not want to buy anything yet at all. In general, these machines do remain solutions in search of a problem or, perhaps better, solutions in search of cost-effectiveness. If you already have a computer, phone, and modem on your desk, you may not be excited about spending several hundred dollars more to meld them together, streamline them, and enhance their capabilities.

But the trend toward fusion is inevitable, especially in the office. And it makes sense. Already, many computers offer modems as standard equipment, and many phones boast computerized functions. The next step does not seem so great, and by 1990 it may well seem strange to see an office computer without a telephone. □

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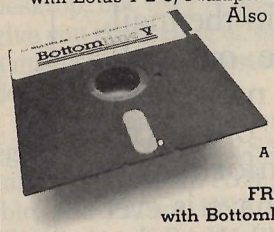

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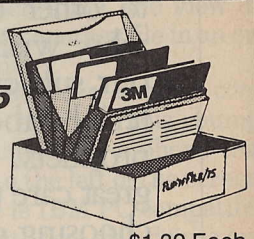

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The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5¼" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

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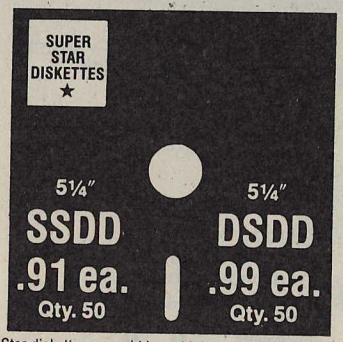

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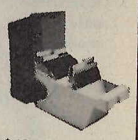

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WHATEVER HAPPENED?

Continued from page 67—

benefits, while regular employees make $4.10 an hour. Though the home workers are willing to work for these wages, the union has denounced the arrangement as a return to the sweatshop (see sidebar on page 134).

Between the extremes of highly skilled project workers and homebound piece workers and part-timers lies the majority of American office workers. Most observers aren't betting that they'll be abandoning their cubicles anytime soon. "You'll probably never see more than four or five percent of the labor force doing most of their work at home," says Jack Nilles, director of Information Technology Programs at the University of Southern California and the man who coined the term "telecommuting" back in the early 1970s.

By all accounts, even though not everyone is suited for working at home, it is not a lack of volunteers that is blocking the spread of telecommuting. When companies announce pilot programs, there are always more applicants than spaces. The obstacle to the electronic cottage is not the worker so much as the manager.

The Managerial Perspective

"It's fear," says Jack Nilles. "The typical manager feels that if an employee isn't in sight, he must be goofing off. It becomes a self-fulfilling prophecy." Nilles says that managers always ask him how they're supposed to know if their off-site employees are working. "I ask them how they know they're working now," he says.

There is more to this fear than a worry that employees will turn their workday into an eight-hour coffee break. There is also the fear that employees, once happily settled before their home terminals, won't need managers anymore. "A lot of supervising work is just overseeing," says Nelson Phelps of Mountain Bell. "Managers, like schoolteachers, are there to watch—are the workers working? Are they putting out the pieces?"

Managerial fear extends beyond worker-boss relations to very real fears about security. Banks, for in-

stance, are already worried enough about electronic intruders tampering with their money. Dispersing data to private homes seems like adding fat to the fire, and many jobs thus remain strictly off-limits to home workers.

NYU's Margrethe Olson points out that managers do not uniformly oppose the idea of letting workers out of their sight. "Good managers—people who know how to bring the best out of people, who trust their employees—don't resist this," she says. "I've met many good managers who want to allow telecommuting, but *their* managers don't want to do it. So a good manager either allows it on the sly or doesn't do it at all." The result has been a growing number of informal, unpublicized arrangements where a trusted employee is allowed to work outside the office as needed.

The most radical experiments in telecommuting are taking place within smaller companies, usually companies tied in some way to the computer industry in the first place. Rising Star has been composed largely of telecommuters since its inception. Chris Rutkowski says it has allowed him to hire people who refuse to live in Southern California. "We say, 'Look, you can stay in the mountains of New Hampshire or in Bechuanaland—you don't have to move,' " Rutkowski says. "It has gotten us a caliber of people we couldn't get otherwise."

Michael Jones, a training manager for NYNEX Retail, which sells computer systems to small businesses, believes that telecommuting is much more likely to work in small companies where the owners themselves are enthusiastic supporters of the trend. "Telecommuting is not inevitable," he says. "It has to be cultured and encouraged because a bureaucracy will kill it dead. In a large company, there has to be a facilitator, a hero, at the very highest level—someone who makes sure the bureaucracy won't stifle the change."

The battle between bureaucracy and innovation may soon be played out on a large scale in California. The Office of Facilities Planning and Development of the state's Department of General Services is con-

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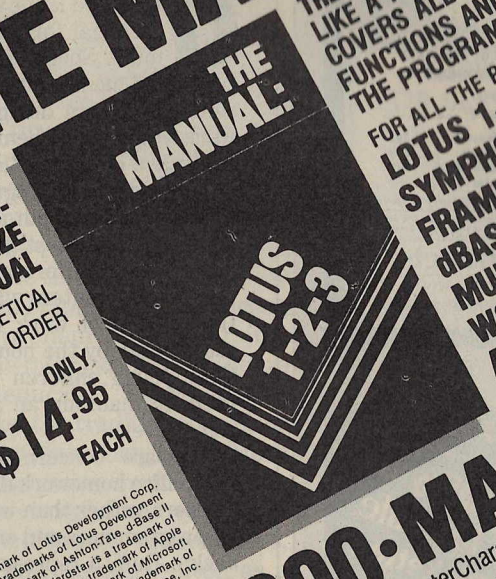

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ORGANIZED LABOR'S VIEW:

Electronic Sweatshops

Organized labor wants to make it illegal for you to telecommute. Spokesmen for several AFL-CIO member unions warn that clerical workers doing home piecework could find themselves in the equivalent of "electronic sweatshops": underpaid, denied regular employee benefits, and without access to management. The most strident of the organized labor forces even suggest that telecommuters who are paid by the amount of work they produce, rather than by the hour, might force their young children to work with them to maintain an acceptable income level.

"We are concerned particularly with office homework done by clerical workers, rather than with work done by programmers and engineers," says Jackie Ruff, a representative of the Service Employees International Union (SEIU), which has been in the forefront of the labor effort. "This is merely an extension of other concerns we have had about office automation—things like routinization of tasks, low pay rates, and health and safety problems. It is very possible, for example, that people doing clerical work at home could be paid less than the minimum wage. How do we monitor that? These are the kinds of issues that worry us."

At its 1983 convention, the AFL-CIO called for a ban on telecommuting, and the SEIU forbids its members from accepting telecommuting positions. The unions suggest that the best way to control potential exploitation of telecommuters might be to expand the scope of a 1943 amendment to the Fair Labor Standards Act of 1938. That amendment banned industrial homework in the garment and jewelry businesses after home-based sweatshops employing newly arrived immigrants were identified as frequent abusers of wage and hour regulations. The unions would like to see the same ban on home-based computer work.

But the unions have yet to succeed in getting anybody to propose legislation on the federal level to ban telecommuting. And labor's hopes for such legislation seems to have faded with the reelection of Ronald Reagan, whose administration is at best unsupportive of the unions.

Union opponents suggest that the real reason organized labor wants to ban telecommuting has more to do with concerns about maintaining membership than with concern for the workers. "It's very hard to organize people in their homes, and it's even harder to collect dues from them," says Lee Bellinger, public affairs director of the Washington-based Center on National Labor Policy. "The unions need new members to continue to exist, and they are afraid that telecommuters will be less likely to become union members."

Bellinger, who says his Center is "in favor of the deregulation of labor relations," warns that even though the AFL-CIO lacks the political pull to get legislation passed, the union isn't likely to give up on the telecommuting issue. "Right now it looks like a stalemate because obviously this administration is not going to allow the regulation of telecommuters," he says. "But that doesn't mean the issue is dead. The union people think in the long term, and they are experts with a real understanding of the psyche of corporate America."

Telecommuting has been an issue at other levels of government. Many communities have zoning laws that restrict or prohibit working at home. Many people believe that the unions will continue to pressure local and state governments to enforce such laws to control the spread of telecommuting.

There is one odd footnote to the whole debate. In 1973, professor Jack Nilles, of the University of Southern California, conducted a study on the future of telecommuting. "We focused on insurance companies, which have a lot of clerical employees," Nilles recalls, "and we found that corporate executives were quite resistant to the idea of telecommuting."

There were many reasons, including concerns about how people working at home might be managed. But one frequently stated management concern had to do with unions. "They were concerned that telecommuters might be too easy to organize," Nilles says, "that the unions could pick them off one by one without management finding out until it was too late."

—JONATHAN SACKS

sidering a project that could involve as many as several hundred state workers. "And not just the highly motivated people, whatever that means," says Dave Fleming, project manager in the department. "I think that people [who telecommute] *become* motivated because they feel that their company trusts them." Fleming hopes so, in any case.

Trust is obviously a key ingredient in any successful telecommuting program. Yet, human nature being what it is, it's unlikely that managers from coast to coast will spontaneously become more trusting in the future. They can, however, learn to reach new kinds of understandings with workers.

Ralph McCrae has been overseeing a small telecommuting project for Control Data in Minneapolis for several years. Most of the workers are employees who have become disabled. McCrae admits that some jobs are hard to quantify, but he feels that's no excuse for returning to the old style of managing by attendance. The manager must make that extra effort to plan out the project in advance, McCrae says, making sure that worker and manager agree on how it will be done and how its success will be measured. "That may delay the start of a project," he says, "but it's better in the long run."

Many managers of pilot programs expect telecommuters to visit the office at least once a week, as much to keep them plugged into the office grapevine as to check on their progress. And companies such as Control Data use computer conferencing systems to keep telecommuters involved. "Although these people are remote, they are not isolated," says Ralph McCrae. "They may even be more on-stream than people in the office."

What the Future Holds

A new burst of telecommuting programs probably will require pressure from the economy. Many of the earlier programs were launched in response not only to rising gasoline costs but also to shortages of skilled workers. These days, computer workers continue to be in demand, and they can often ask for special arrangements. "In order to attract the technical geniuses who want to ski Aspen on Monday afternoon, we're going to have to change our approach," says Mountain Bell's Nelson Phelps.

The individually negotiated arrangement seems to be the key to the growth of telecommuting, not first-come, first-serve sign-up programs. Spurring the trend is the fact that more and more jobs are centered around microcomputers, and micros can be plugged in anywhere.

At the same time, a blurring of the line between employees, freelancers, and entrepreneurs is occurring, aided by the micro and by the bulge of college-educated baby-boomers frustrated by the traditional wait for promotions within companies. More and more computer owners are becoming work-at-home entrepreneurs—consultants, researchers, engineers, and the like—often as a way to find satisfying work.

The future is likely to bring a mix-and-match assortment of decentralized working arrangements. Jack Nilles talks of satellite offices that large companies might set up outside cities, complete with terminals and supervisors. Unused school buildings could be converted for the task, one classroom per company.

Marcia Kelly, president of Electronic Services Unlimited in New York City and a telecommuting consultant, feels that the trend is indeed inevitable despite the slow progress to date. "The tool that makes it inevitable," she says, "is the personal computer. Once it reaches the saturation level of the television and the telephone, then managers will feel comfortable with it." Kelly expects telecommuting to take off by the end of the decade.

As for telecommuters themselves, few are likely to work at home day in and day out, year after year. Instead, for many people the ideal arrangement may be to go in and out of telecommuting during their working years.

Unless gas prices rise to $10 a gallon, young children at home learn to fall worshipfully silent in the presence of their elders, and managers mutate en masse into more trusting creatures, it looks as though rush hour is here to stay. □

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Continued from page 74—
a pair of needle-nose pliers, a pair of wire strippers, a pocket knife, fine sandpaper, a small file, a 25- to 35-watt soldering gun, and 60/40 rosin core solder.

But more important, you need some minimal training in how to check for breaks and loose contacts; correctly solder broken wires and cables; properly clean cable ends, ports, pins, and chips; remove, replace, identify, and order chips; and properly ground yourself before you poke around inside the computer. Reading detailed descriptions of these techniques will often suffice. Better yet, having them demonstrated and practicing them yourself will give you an added measure of confidence and help eliminate mistakes arising from trial and error.

One source of this information is books or manuals on digital electronics and computer operations (see sidebar, at right). These books offer suggestions for environmental control and preventive practices, discussions of applied digital electronics, and a variety of practical tips on computer maintenance.

A second source of information is classes offered by a junior college, business, technical or vocational school, and adult education or regional training program. The education these schools offer, however, is often geared toward a career in the industry and requires a substantial commitment of time, energy, and money. When choosing one of these courses, try to find one that stresses hands-on skills and minimizes electronic theory.

A third source is correspondence schools. With any of these schools, make sure of what you're getting before you sign up. Also, realize that the completion rate for these courses runs about 2 to 3 percent, simply because it takes a lot of self-motivation to learn in isolation.

A fourth and relatively new approach to learning the basics is attending a workshop designed specifically for computer owners interested in maintaining and fixing their own computers. The first organization to offer workshops of this kind is the Cascio School of Computer Technology in San Ramon,

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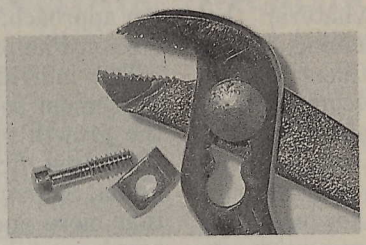

BOOKS AND MANUALS

Don't! (or How to Care for Your Computer) by Rodnay Zaks, Sybex, 1981, $11.95

Practical Troubleshooting for Microprocessors by James W. Coffron, Prentice-Hall, 1981, $22.95

The Plain English Repair and Maintenance Guide for Home Computers by Henry F. Beechhold, Simon & Schuster, 1984, $14.95

Introduction to Microprocessors by Charles M. Gilmore, McGraw-Hill, 1981, $17.95

Digital Electronics, 2nd edition, by William H. Gothmann, Prentice-Hall, 1982, $24.95

Microcomputer Hardware Handbook by Ing W. Hofacker, Elcomp Publishing, 1982, $14.95

SUPPLY CATALOGS

Jameco Electronic Parts Catalog, 1355 Shoreway Rd., Belmont, CA 94002 (415) 592-8097; $1

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Cleveland Institute of Electronics, 1776 East 17th St., Cleveland, OH 44114; (216) 781-9400

NRI Schools, McGraw-Hill Continuing Education Center, 3939 Wisconsin Ave., Washington, D.C. 20016; (202) 244-1600

National Technical Schools, 4000 South Figueroa St., Los Angeles, CA 90037; (213) 234-9061

NATIONAL WORKSHOPS

The Cascio School of Computer Technology, Suite B109, 2580 San Ramon Valley Blvd., San Ramon, CA 94583; (415) 829-5140; call or write for schedule of workshops in your area.

California. Organized a year ago by a former computer-repair instructor, the school conducts one-day workshops in every major city in the United States.

The $150 workshop fee includes a tool kit with a set of screwdrivers, pliers, abrasives, a soldering gun and solder, and a troubleshooting manual. Participants get hands-on training in cleaning; soldering; chip removal, replacement, identification, ordering, and substitution; keyboard operation and maintenance; and disassembling and reassembling computers. They also build continuity testers (devices with an LED that clips to each end of a wire, cable, or fuse to test for breaks or loose contacts), as well as a static-discharge device. Finally, workshop participants receive a practical explanation of circuit-board organization and function.

The skills participants learn go beyond just conquering fears. One participant, for example, used his newfound knowledge to replace a blown chip on one of his Apple disk-drive controller cards. Previously, he reported, such a repair would have meant traveling 40 miles to an Apple dealer, plus a $50 to $75 repair bill and at least three days of downtime.

A Fix in Time

Of course, once you acquire the skills and tools, you might still prefer to send your computer out for repair, especially if you have money to burn or you're one of those lucky individuals who has discovered a reputable, reliable, and fast repair shop. But performing your own simple, semitechnical repairs can cut down your trips to the shop and catch problems before extensive damage is done.

Similarly, by capitalizing on your skills, you needn't trade in an older model or donate it to a charitable organization for a tax write-off just because a snazzier one appears on the market. It often makes more sense to maintain your machine and progressively upgrade it as your needs demand. With proper maintenance and minor repair, a computer will last for many years and continue to do the job it was built to do. □

Continued from page 72—

amount of fats in athletes' diets, trying to keep the players under 15 percent body fat, with a goal of 12 percent. Nutri-Calc's features, he notes, include diet analysis, menus, recipe storage, and schedules for weight loss, all backed by a modifiable 900-food database broken down into 18 essential nutrients.

Nutritionist II, which commands one of the highest price tags at $295, has 40 nutrient breakdowns and 883 foods, as well as a variety of exercise and activity program recommendations. You can specify particular vitamins or minerals needed in your diet, and Nutritionist II will display a selected list of foods.

Sizing Up Your Choices

Certainly there's a bit of novelty and reinforcement in seeing your personal diet and exercise values displayed via computer-generated tables and graphs. But as with any attempt at building endurance or tightening the tummy, you have to develop a regular discipline of entering your daily or weekly logs of information. If you find that you start an exercise program or new diet for a few weeks and then quickly lose interest, the computer isn't going to help. To get your money's worth from this type of software, you have to use it every day.

Before you select a diet or exercise program, decide which nutrients and other data you'd like to track. Also, fitness software varies in sophistication and ease of use, a factor that may be important if you want family members to log exercise and nutrition data. Some of the simple and inexpensive diet programs may be just right for the kids. (Because some of the current packages are not widely distributed, you might have to contact the maker to get full information on specific features.)

For the future, we'll probably see more health software with a greater number of features and flexibility. Rather than emphasizing diet or exercise, software will offer options for nutrition, weight control, running, aerobics, and pulse rate, for example, all in one package—and probably at lower prices.

Not even the best nutrition and exercise programs can provide an effortless path to good health. But if you're determined to achieve that tough but attainable goal, these programs can be a worthwhile addition to your bathroom scale, sweatpants, and running shoes. □

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James F. Fixx Running Program for IBM PC, XT, PCjr (with 256K bytes of RAM), $79.95. Micro Education Corporation of America, 285 Riverside Ave., Westport, CT 06880; (203) 222-1000

Master Control Diet & Exercise Program for IBM PC, XT, PCjr; $39.95. Healthware, Suite 209, 2300 Round Rock Ave., Round Rock, TX 78681; (512) 863-6910

Nutri-Calc for IBM PC, XT, PCjr, Apple II series, TRS-80 Models II, III, 4, 12, 16, Epson QX-10; $129. PCD Systems Inc., POB 277, 163 Main St., Penn Yan, NY 14527; (315) 536-7428

Nutritionist II for Apple II series, IBM PC, XT, PCjr, TI Professional, and CP/M-80 systems; $295. N-Squared Computing, 5318 Forest Ridge Rd., Silverton, OR 97381; (503) 873-5906

Original Boston Computer Diet for Apple II series, IBM PC, XT, and PCjr, $79.95; for Commodore 64, $49.95. Scarborough Systems Inc., 55 South Broadway, Tarrytown, NY 10591; (800) 882-8222 or (914) 332-4545

REACTIONS

A showcase of comments, kudos, outcries, opinions, gripes, and grumblings

THE DEATH OF PCjr

JUDGING FROM THE SACK OF MAIL we received recently, most readers clearly understood that our May issue with Steven Levy's column on "The Resurrection of the PCjr" was rolling off the presses at the same time IBM announced it was halting production of its controversial PCjr. Levy devoted his column to responding to the scores of letters about his January article, "The Life and Times of the PCjr," which, as you may recall, proclaimed that the machine had "the smell of death about it." Although a few readers interpreted the follow-up column as an apology to IBM, the vast majority applauded Levy for sticking to his guns and believed that he thought the machine was worthy of consideration only at its drastically reduced pre-Christmas sale price. Here are some excerpts and a reply from Levy:

Dear Mr. Levy:
I just read "The Resurrection of the PCjr" and couldn't help but wonder if you were laughing now at all the critics who chastised you for remarking that it had "the smell of death about it." Knowing that you probably wouldn't say it, I thought I'd say it for you. You told them so!

—KEVIN INMAN
FALLS CHURCH, VA

Three cheers for your recent articles on the PCjr. In my book, you called the shots as you saw them and then held your position in the face of adversity. It just goes to show that the computer marketplace is an intelligent one that can make up its own mind about which products to buy.

—PAUL G. POMEROY
CINCINNATI, OH

It is easy to laugh at [those] who believed in Big Blue. I haven't made such a dumb mistake since I bought a TI-99. But the truth is that we all, as supporters of the microcomputer manufacturers, are weakened when companies like IBM put the screws to their customers. It is a reminder that those who gamble on new products are likely to get burned. It seems a shame, but IBM has further undermined our faith in new products. Allan Scott asked "Who the hell is Steven Levy?" and canceled his subscription. Maybe he'll reconsider. I don't like dark prophecies, but when they're accurate they sure beat reassuring lies.

—STEVE ELDER
FT. COLLINS, CO

What is IBM going to do for its customers who on good faith purchased the Jr. and have been totally let down? Frankly, I'm not quite sure if I ever wish to do business again with this firm unless it makes some restitution on the Jr.

—LOUIS R. DESPRES
KENT, WA

Now that IBM has made its announcement, I wonder how many people who bought a PCjr still feel so satisfied with their machine? They probably won't bother to write you, I suppose. —IRVIN M. HAAS
CARMEL, IN

Thanks to all those who wrote encouragement. While the long lead time between completion and publication of my column can be annoying, it does keep me honest. As for the PCjr, I refuse to gloat; IBM is a company capable of learning from its mistakes, and this computer was such a mistake that Big Blue has learned plenty. Let's wait and see how it applies those hard-earned lessons —*S.L.*

GÖDEL'S DOOM

IN OUR FEBRUARY ISSUE, WE EXperimented with our first computer science fiction piece, "Gödel's Doom" by George Zebrowski. According to your letters and the results from the Reader Feedback section (which appears on the Reader Service card in the back of the magazine each month) the story simultaneously was one of the best-liked and least-liked articles we have run.

I found "Gödel's Doom" a marvelously interesting story. I don't read much science fiction, but I found this story so engrossing I kept dinner waiting half an hour (which my wife still hasn't quite forgiven) until I finished it.

What makes it a particularly interesting story to the Bertrand Russell Society is that it's about Gödel's theorem—which demolished what Bertrand Russell and Alfred North Whitehead thought they had proved in *Principia Mathematica*, that mathematics is a branch of logic.

Gödel's theorem did not prevent *Principia Mathematica* from being useful. As you probably know, it helped lay the groundwork for the logic used in computers. Specifically, it developed a calculus of propositions, solving equations by statements that are either true or false. In 1937 this kind of logic made the jump from theory to electrical circuitry when Shannon applied it to the design of electrical circuits, in his thesis, "Symbolic Analysis of Relay and Switching Circuits."

—LEE EISLER
VICE PRESIDENT, INFORMATION
BERTRAND RUSSELL SOCIETY
COOPERSBURG, PA

What Gödel's proof does for me is to point up the inadequacy of formal

logic and mathematics to encompass the whole of existence.

Disproving Gödel's theorem cannot in itself change reality, nor did the original proof change the nature of human thought or the nature of finite automata in general. It certainly did not alter the nature of causality. It just served to show us that we should not expect to be able to judge all of thought, or all the far corners of causality, according to their conformance to the rules of a formal system, nor does it make sense to try to create formal systems capable of such judgment. Mathematics and logic have their places, and their power, but there are more things in heaven and earth than are dreamt of in your formal systems. So let's feel free to explore those things that lie outside the province of math and logic.

I enjoyed the story and found that it was well developed from the premises. It was the premises themselves that were so problematic for me that I was somewhat distracted from the plot. I couldn't help as I read the story thinking of how capable the unaided mind already is of taking great flights into alternative universes. The excitement of the new and more powerful AI machines will be the uses we will put our minds to, once logical reasoning has been trivialized by its mechanization. It is certain that the human spirit will not allow us to just leave well enough alone and go into cognitive retirement.

—PAUL A. COOK
WESTWOOD, MA

As a writer of fiction, I often assume, for purposes of the story, many things that I would not wish to hold if I were writing nonfiction; yet many readers have tried to hold me accountable for the views they have found in my stories.

As to whether Gödel's theorem, as presented in my story, would have an effect on probability, this is a fanciful wedding of Gödel and Heisenberg that I would not expect anyone to take seriously—until it happens.

Beyond all this, I believe that if anything is remembered from our civilization 100,000 years hence, it will be Gödel's work in mathematics and Einstein's in relativity.—G.Z.

Luminous Underwear?

Mitchell M. Sisak, in his letter to the editor (December 1984) takes Randolph Blake, "Choosing a Color for Monochrome CRTs" (page 175, September 1984) to task for his explanation of the process of luminescence. The fact is that Blake's succinct sentences are quite correct, and, for that matter, so is what Sisak had to say. But Sisak's letter, in context, is misleading. Lest the young or others uninformed on this subject be led astray, let me point out that, in either case, firefly or CRT, the final common pathway is indeed the same: a shower of photons is emitted, and by the exact same final mechanism in each case.

Sisak is quite correct that the glow evident in the wake of a boat on a moonless night is due to bioluminescence from certain species of plankton. Some fishes have rather elaborate light-emitting organs, complete with silvery reflector, a light-emitting membrane, and a lens to focus the beam.

There are luminous bacteria. In the Dark Ages when the custom of washing underwear was less well observed than now by some people, certain individuals' undergarments became luminous by reason of colonization with luminous bacteria. Some men did, indeed, glow in the dark. Some were revered as very holy men, and others were burned at the stake as witches.

In every case, the final product is the photon, and when your eye detects a stream of them, you can be sure they came from the same phenomenon, whether you are watching your CRT or admiring the sexual come-hither signals of avid fireflies at dusk.

—GEORGE R. MENEELY, MD, MACP
SPECIAL PROJECTS AND EMERITUS PROFESSOR OF MEDICINE, PHYSIOLOGY, AND BIOPHYSICS
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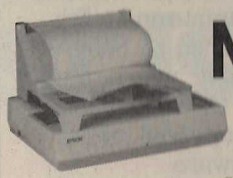

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Inquiry 2

The Great Arcade Con

Who's responsible for the sorry state of educational software?

In spite of all the commercial hype that life without a computer is the first step toward scholastic failure and shattered dreams, the actual educational benefits of computers have been quite limited. Parents and teachers are foolish to believe that learning will be enhanced by the vast majority of commercial educational software.

Much of this software reflects an almost Kafkaesque passion to reduce educational concepts to arcade-type formats. The logic is abundantly clear: if students will flock to the local video arcade to spend countless quarters on eating, hitting, and zapping video shapes, it stands to reason that they will of course be motivated to expend the same energy on educational concepts disguised as arcade games.

Unfortunately, this logic has a hole in it. The dazzling scenarios created by software developers are all too frequently awkward and lame imitations of their arcade prototypes, devoid of any real educational content. A program that lets kids blast a math fact out of the sky or make a video creature eat correctly identified numbers, letters, or words often is little more than a demonstration of the programmer's prowess.

Now there's nothing wrong with trying to make educational material interesting—but in too many software packages valid educational content becomes secondary to creating a task that is lots of fun. It doesn't seem to make any difference if the task is too easy or if absolutely nothing is learned as long as there is an abundance of color, sound, and graphics.

In short, the need perceived by many software developers is not the shaping and development of response patterns (an appropriate use of arcade-type scenarios) or the selection of meaningful educational material; it is to impress potential buyers with novelty and video gymnastics. An inordinate number of programs dealing with early elementary material reflect this emphasis on form rather than content. Developers seemingly begin with a task that is thought to be appealing and then insert educational content almost as an afterthought.

The problem, however, is not the mountainous number of drill-and-practice programs, nor is it the development of slick software that is packaged more to sell than to teach. The problem is parents and educators who allow themselves to be duped into buying software packages without considering real educational needs.

There's no doubt that software developers must be encouraged to redirect their attention from machine athletics to meeting real educational needs. And software reviewers might spend less time commenting on "nice sound" and "good graphics" and more time imparting valuable consumer information about content, learning considerations, and effectiveness.

But it is parents and educators who must realize that they have primary responsibility for determining what is educationally relevant for their children and their students.

When parents take time to do this, they just might find that reading to or with a child is far more beneficial than playing the latest version of Killer Tuna Meets Word War. Similarly, school administrators who give careful thought to whether software (and not merely the computer) will actually improve the quality of education will make wiser spending decisions as they try to keep up with technological advances.

Some good educational software has already been developed and, undoubtedly, more will be. But as long as the bulk of it reflects an arcade mentality founded in misperceived needs and glorification of technology, the quality of the software won't improve and the impact of computers on education will be negligible, although quite costly. In short, let the buyer beware.

—EDWARD BURNS

Edward Burns is the author of *The Apple Math and Reading Development Kit* (Reston, 1985).

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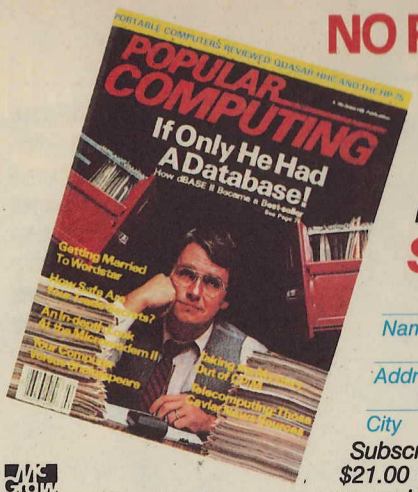

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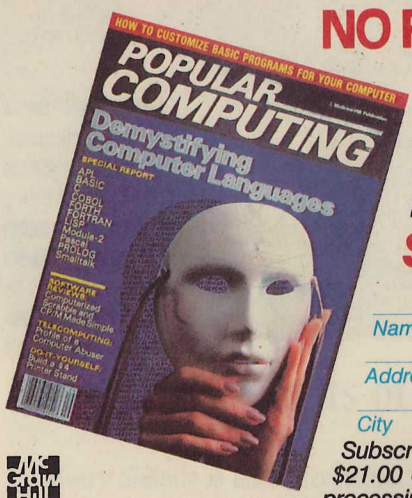

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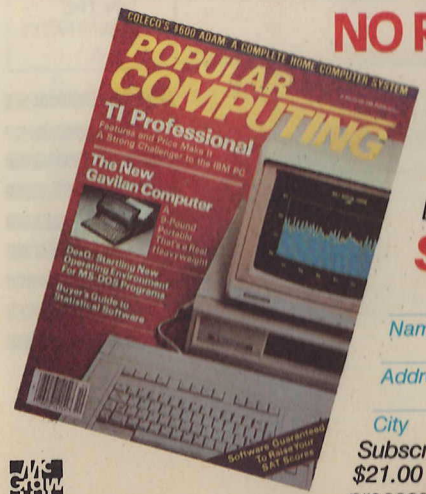

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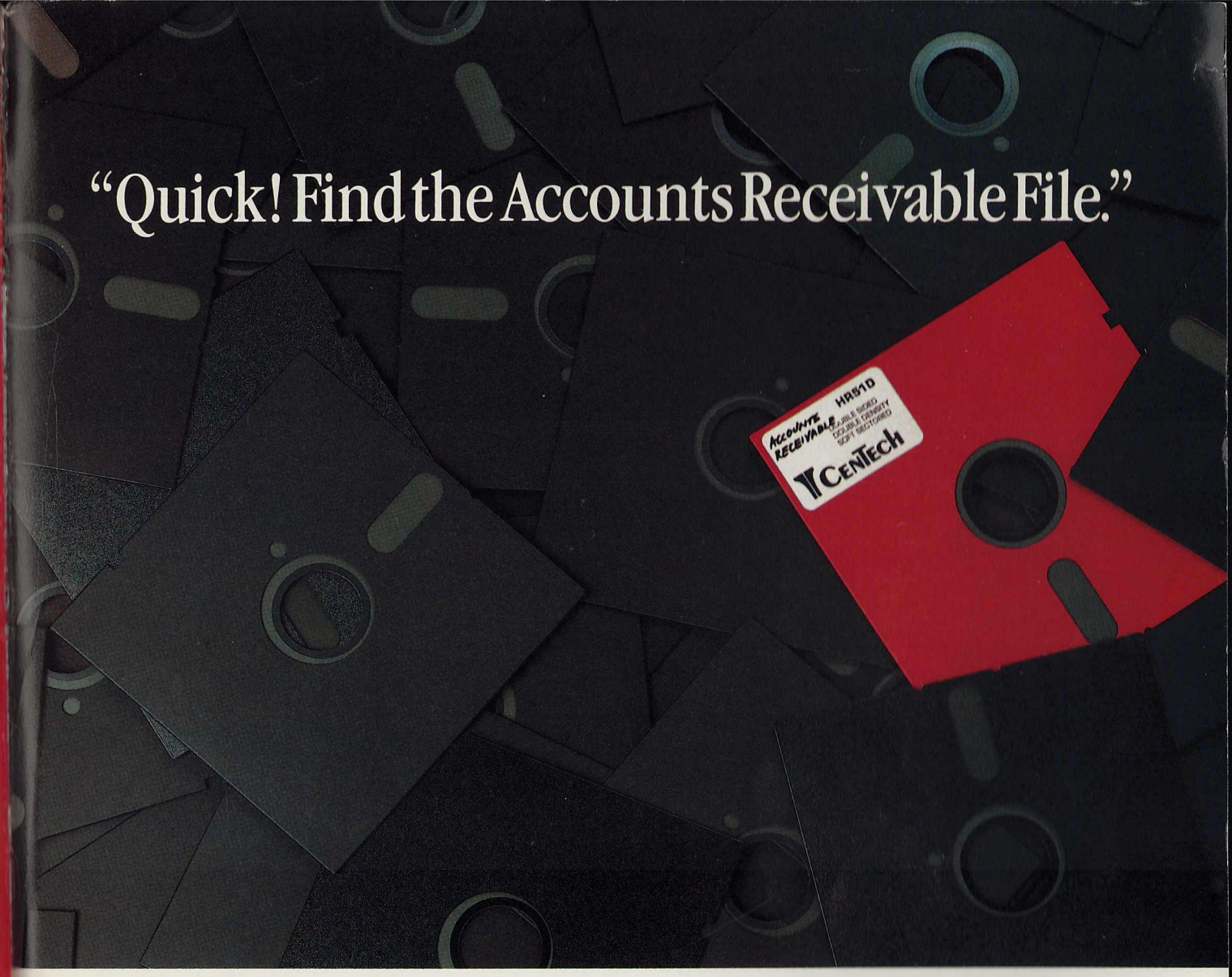

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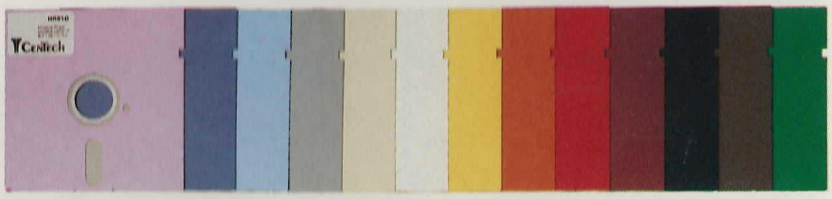

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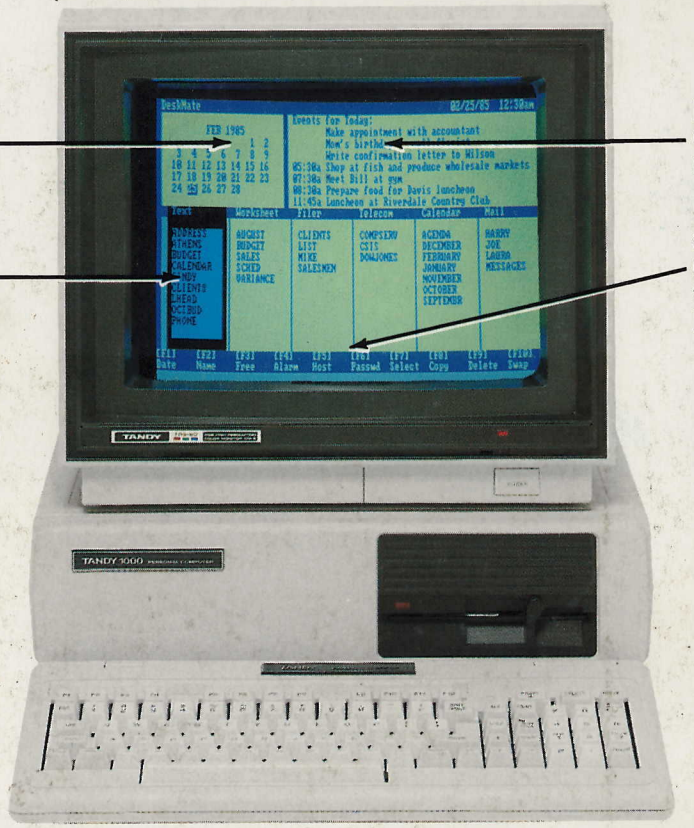

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